A STUDY OF MATERNAL MORTALITY IN ANANTAPUR DISTRICT

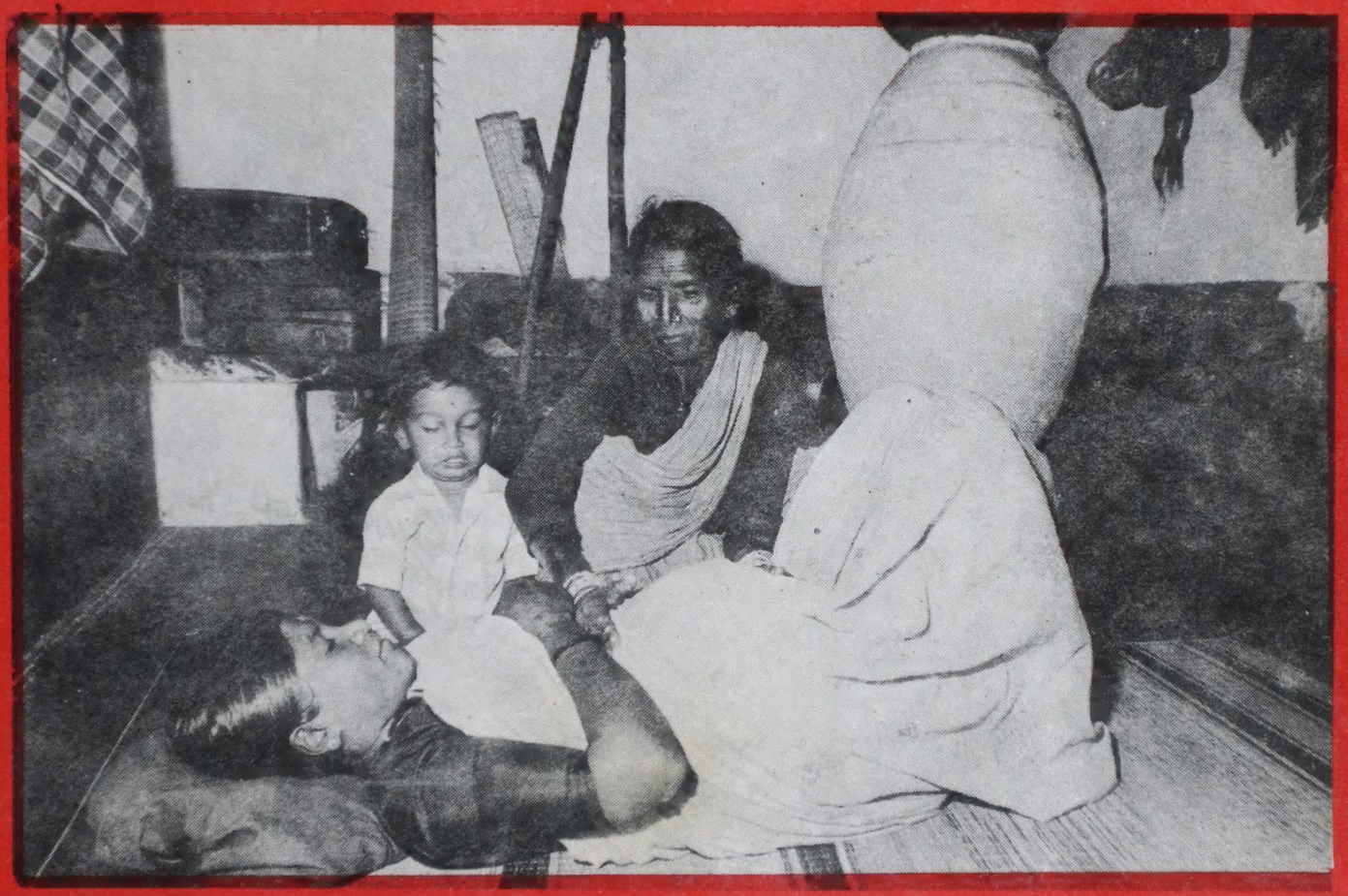
ANDHRA PRADESH, INDIA

(Sponsored by the World Health Organization)

by

Dr. JAGDISH C BHATIA

Professor of Population and Health Management



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CONTENTS

		Page No.
	Foreword	
	Acknowledgements	
	List of Tables	
	Summary	
I.	Introduction ..	1
II.	Objectives of the Study ..	2
III.	Location of the Study ..	2
IV.	Scope of the Study ..	3
V.	Materials and Methods ..	3
VI.	Findings : Levels of Maternal Mortality ..	6—8
	6.1 Age Distribution of deaths in the reproductive age group (all causes) ..	6
	6.2 Age distribution of maternal deaths ..	6
	6.3 Recorded deaths in the reproductive age group (all causes) by type of village ..	6
	6.4 Recorded deaths in the reproductive age group (all causes) by age of woman ..	6
	6.5 Recorded maternal deaths by type of village ..	6
	6.6 Recorded maternal deaths by age of woman ..	7
	6.7 Levels of maternal mortality ..	7
	6.8 Age specific maternal mortality ratio ..	7
	6.9 Age specific maternal mortality rates ..	7
	6.10 Contribution of maternal mortality to total female mortality in the age group 15–49 ..	8
	6.11 Levels of maternal mortality by development status of the village ..	8
	6.12 Levels of maternal mortality by distance from health facilities	8
VII.	Pregnancy out come and causes of maternal deaths ..	9—10
	7.1 Outcome of latest pregnancy ..	9
	7.2 Type of delivery ..	9

7.3 Place of occurence of death .. 9
7.4 Family's awareness of seriousness of patient's condition .. 9
7.5 Gestation period at death .. 9
7.6 Time interval between delivery and death .. 9
7.7 Stage of occurance .. 10
7.8 Obstetric causes of maternal deaths .. 10
7.9 Clinical causes of maternal deaths .. 10
7.10 Main clinical causes for maternal deaths by age .. 10
7.11 Main clinical causes of deaths by number of live births .. 10

VIII. Comparison of characteristics of maternal deaths and control cases in rural areas .. 10—16

8.1 Religion .. 10
8.2 Caste .. 10
8.3 Family type .. 11
8.4 Family size .. 11
8.5 Socio-economic status .. 11
8.6 Literacy status of women .. 11
8.7 Occupational status of women .. 11
8.8 Educational status of woman's husband .. 11
8.9 Family's contact with outside world .. 11
8.10 Maternal age .. 12
8.11 Husband's age .. 12
8.12 Age at marriage .. 12
8.13 Age at first pregnancy .. 12
8.14 Number of pregnancies .. 12
8.15 Number of live births .. 12
8.16 Number of still births .. 13
8.17 Number of prior abortions .. 13
8.18 Number of living children .. 13
8.19 Number of living sons .. 13
8.20 Birth interval .. 13
8.21 Birth interval between last two births .. 13
8.22 Usual source of treatment of illnesses in the family .. 13
8.23 Knowledge about location of primary health centre (PHC) .. 14
8.24 Visit to primary health centre (PHC) .. 14
8.25 Satisfaction with PHC services .. 14
8.26 Knowledge of location of sub-centre (SC) .. 14
8.27 Visit to sub-centre .. 14
8.28 Satisfaction with sub-centre services .. 14
8.29 Visit to other government facilities .. 14

8.30 Knowledge of female health workers, domicillary visits .. 14
8.31 Knowledge of male health workers, domicillary visits .. 14
8.32 Place of delivery .. 15
8.33 Assistance during delivery .. 15
8.34 Number of complications/problems during previous pregnancies 15
8.35 Presence of predisposing health condition .. 15
8.36 Number of predisposing health conditions .. 15
8.37 Presence of danger signals during pregnancy .. 15
8.38 Registration for ante-natal care .. 15
8.39 Gestation period at which registered for ante-natal care .. 15
8.40 Number of ante-natal visits .. 15
8.41 Health worker's visits to woman's home .. 16
8.42 Advise or help sought during pregnancy .. 16

IX. Comparison of characteristics of maternal deaths and control cases in urban areas .. 16

X. Preventability of maternal deaths .. 16

XI. Discussion and conclusions .. 17

References .. 20

Tables .. 23 to 52

Interview schedule .. 53

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1 August 1988

FOREWORD

It is a great honour as well as a pleasure to be asked to contribute a preface to the Report on the Study of Maternal Mortality which was made in Anantapur District, Andhra Pradesh, in 1985 - 1986 by Dr Jagdish C. Bhatia and his colleagues at the Indian Institute of Management, Bangalore. This study has been a veritable milestone in the development of research in maternal mortality in India. Strangely enough, until this study was carried out, there had been very little research on the extent of maternal mortality in India on a community basis. There had been indeed been a very fine and extensive hospital based study of the Federation of Obstetrical and Gynaecological Societies of India (FOGSI) and coordinated and reported on their behalf by Professor Bhasker Rao & the late, much loved and much lamented Professor M.K. Menon. However this was the first time that Indian investigators had ventured on a community-based study. Those in the Indian government who suggested Professor Bhatia and the Indian Institute of Management as the investigators deserve our thanks, for it turned out to be a wise choice. Dr Bhatia, with very little financial resources boldly ventured into this unknown territory. I am sure that the reader of this Report will agree with me that he and his co-workers triumphed because of ingenuity, pertinacity, perspicacity, and a certain sympathy for a subject of much human importance.

Thus the study broke new ground. No human enterprise is perfect, and I am sure that Dr Bhatia and his co-workers could think of new ways to approach this task even after this short time. However I hope that others will join in this important field of maternal health research, each contributing his, or especially her, own special talents and all towards the ambitious goal that India should reduce her maternal mortality by half before the year 2000.

Dr Robert Cook
Senior Medical Officer
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Geneva

ACKNOWLEDGEMENTS

The author would like to express his sincerest thanks to the World Health Organisation (WHO) for sponsoring this important study. The study involved enormous amount of field work and collection of large volume of data from a vast area. It has been a great learning experience and immense satisfaction for the author to complete this study with a modest budget of US $ 6,000 by using imaginative and innovative approaches. Sincerest thanks are due to M/s. M. Sreenivasa Raju, S. Nazeemuddin, C. Narayana Reddy, T. Poli Reddy, I. Subba Reddy and N. Sreenivasalu Reddy field interviewers who travelled hundreds of miles in every corner of the district by foot, bicycle, bullock cart, bus or any other available transport for collection of data under rigorous rural field conditions. But for their commitment to this task and hard work, the study would not have been completed. Mr. Sreenivasa Raju also helped in the coding and analysis of data and worked long hours to complete the same within the shortest possible time. He deserves special appreciation. Mr. D. Govindappa supervised the work in the field and facilitated data collection from the records. The author is thankful to him. The officers and staff of the Directorate of Health and Family Welfare Services, Andhra Pradesh, have been highly cooperative and provided all possible assistance. Although it is not possible to name each one of them, the author recognises and appreciates their contributions. The author is specially grateful to Mr. R. Sivarama Raju, Deputy Director and Dr. Sreeramulu, District Health & Family Welfare Officer, Anantapur, for their valuable support and guidance. Dr. Mahalaxmiamma, Superintendent, Maternity Hospital, Hyderabad, provided expert assistance for analysing the clinical aspects of the data and grateful thanks are due to her.

Thanks are also due to the Director of the Indian Institute of Management, Bangalore, Prof. Joseph Philip for providing all institutional support and encouragement. Last but not the least, the author would like to thank his Secretary Ms. Rajini for providing able secretarial assistance and Mr. B. Venkata Rao for typing the manuscript at a short notice.

LIST OF TABLES

No.	*Title*
1	Distribution of female deaths in the age group 15–49 identified in the rural and urban areas of Anantapur district, India, by age of woman.
2	Distribution of maternal deaths identified in rural & urban areas of Anantapur district, India, by age of woman.
3	Recorded total female deaths 15–49 (all causes) as proportion of female total deaths (15–49) in rural areas of Anantapur district, India, by type of village.
4	Recorded total female deaths (all causes) in the age group of (15–49) as proportion to total female (15–49) deaths in rural areas of Anantapur district, India, by age of woman
5	Recorded maternal deaths as proportion to total maternal deaths in rural areas of Anantapur district, India, by type of village.
6	Recorded maternal deaths as proportion to total maternal deaths in rural areas of Anantapur district, India, by age of woman.
7	Maternal mortality ratios (maternal deaths per 1000 live births) in rural and urban areas of Anantapur district, India, 1984–85.
8	Age specific maternal mortality ratios (maternal deaths per 1000 live births) in the rural and urban areas of Anantapur district, India, 1984–85.
9	Age specific maternal mortality rates (maternal deaths per 10,000 women, 15–49) in rural and urban areas of Anantapur district, India, 1984–85.
10	Maternal deaths as proportion of All deaths in the female age group 15–49 in the rural and urban areas of Anantapur district, India, by age.
11	Level of maternal mortality in the rural areas of Anantapur district, India, by development status of the village.
12	Level of maternal mortality in the rural areas of Anantapur district, India, by distance of villages from Government health facilities.
13	Distribution of maternal deaths in the rural and urban areas of Anantapur district, India, by outcome of latest pregnancy.
14	Distribution of maternal deaths in the rural and urban areas of Anantapur district, India, by type of delivery.
15	Distribution of maternal deaths in the rural and urban areas of Anantapur district, India, by place occurence of death.

Table No.	*Title*
16	Distribution of maternal deaths in the rural and urban areas of Anantapur district, India, by family's awareness of seriousness of patient's condition before death and action initiated.
17	Distribution of maternal deaths in the rural and urban areas of Anantapur district, India, by gestation period (in weeks) at death.
18	Distribution of maternal deaths in the rural and urban areas of Anantapur district, India, by time lapse between delivery and death.
19	Distribution of maternal deaths in the rural and urban areas of Anantapur district, India, by stage of occurence of death.
20	Obstetric causes of maternal deaths in the rural and urban areas of Anantapur district, India.
21	Clinical causes of maternal deaths in the rural and urban areas of Anantapur district, India.
22	Distribution of main clinical causes of maternal deaths in Anantapur district, India, by maternal age.
23	Distribution of main clinical causes of maternal deaths in Anantapur district, India, by number of live births.
24	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by religion.
25	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by caste.
26	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by family type.
27	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by family size.
28	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by socio-economic status of family.
29	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by literacy status of woman.
30	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by occupational status of woman.

Table No.	*Title*
31	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by educational status of woman's husband.
32	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by family's contact with outside world.
33	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by maternal age.
34	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by age of husband of the woman.
35	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by woman's age at marriage.
36	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by age of the woman at first pregnancy.
37	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of pregnancies of woman.
38	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of live births.
39	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of still births.
40	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of prior abortions.
41	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by living children.
42	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of male living children.
43	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by birth interval.
44	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by birth interval between last two births.
45	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by usual source of treatment of illnesses in the family.
46	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by knowledge of location of primary health centre.

Table No.	Title
47	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by visit to primary health centre (PHC).
48	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by satisfaction with primary health centre (PHC), services.
49	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by knowledge of location of sub-centre.
50	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by visit to sub-centre.
51	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by satisfaction with the sub-centre services.
52	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by visit to other Government health facilities.
53	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by knowledge of female health workers domicillary visits.
54	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by knowledge of PHC male health worker's domicillary visits.
55	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by place of delivery.
56	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by assistance during delivery.
57	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of complications/problems during pregnancies.
58	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by presence of predisposing health conditions.
59	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of predisposing health conditions.
60	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by presence of danger signals during pregnancy.
61	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by registration for ante-natal care at health facility.
62	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by month of pregnancy at which registered for ante-natal care.

Table No.	*Title*
63	Distribution of maternal deaths and controlled cases in the rural areas of Anantapur district, India, by number of visits for ante-natal check up.
64	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by number of health worker's visit to woman's home.
65	Distribution of maternal deaths and control cases in the rural areas of Anantapur district, India, by advise or help sought during pregnancy.
66	Socio-economic, demographic and health behaviour related differences in maternal death and control cases in the urban areas of Anantapur district, India.
67	Distribution of Maternal deaths in the rural and urban areas of Anantapur district, India, by preventability of death.

SUMMARY

S.1 The level of maternal mortality in this study, which is based on both hospital statistics and community surveys carried out in a district of southern India, has been found to be 8.30 deaths per 1000 live births. Furthermore, the contribution of maternal deaths to total mortality in the female reproductive age group is very high (36.4%) in this study.

S.2 The study indicates considerable under-registration of deaths. A little less than one half (44.6%) of the identified deaths in the reproductive age group 15–49 were found in the health facility records. Similarly only one-thirds (34.5%) of the maternal deaths were entered in the records maintained by the PHC/ Sub-centres.

S.3 There are not only rural–urban variations in maternal mortality, intra-rural differentials are also apparent from this study. The levels of maternal mortality are four times higher in poorly developed villages as compared to highly developed villages. The levels of mortality have been also found to be significantly lower in the villages where PHC/SCs are located as compared to the villages where no such facilities exist.

S.4 Out of 284 maternal deaths for which detailed information was collected 62.3% resulted in live births, 14.1% in still births, 10.1% in abortions, and remaining 12.7% of the women did not deliver. Approximately in one-fifths of the cases the labour was prolonged. Further less than half the women died in the hospital, while majority died at home or on the way to the hospital.

S.5 The percentage of ante-partum, intra-partum, and post-partum deaths works out to be 19.0, 11.6 and 69.4 respectively. About two-thirds of deaths are reported to be due to direct obstetric causes and the remaining one-thirds (33.1%) due to indirect causes. The major clinical causes of maternal mortality have been found to be : Sepsis (36.0%), Haemmorrhage (12.3%), Eclampsia (9.2%), retention of placenta (7.2%), infective hepatitis (9.8%), and severe anaemia of pregnancy (9.2%).

S.6 The maternal deaths and control cases have been compared with regard to a large number of demographic, social, economic, and health behaviour related characteristics. The similarities and differentials are shown in the summary table. The variables significantly different are : (i) caste (ii) family size (iii) socio-economic status (iv) literacy status of woman and her husband, (v) age group of woman (vi) first and higher pregnancy order (vii) number of stillbirths (viii) number of abortions, (ix) number of living children (x) number of living male children (xi) awareness and utilisation of health facilities (xii) presence of predisposing health conditions and danger signals, (xiii) registration for ante-natal care and number of ante-natal visits, etc.

S.7 According to the opinion of the expert Obstetrician-Gynaecologist 40.8% of the deaths were definitely preventable, 37.0% possibly preventable, and the remaining 22.2% were not preventable. The steps required for prevention have been indicated in the report.

S.8 The findings have been discussed and appropriate recommendations have been made.

SUMMARY TABLE

SOCIO–ECONOMIC, DEMOGRAPHIC AND HEALTH BEHAVIOUR RELATED DIFFERENCES IN MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA.

VARIABLE	RURAL (n = 262)			URBAN (n = 22)		
	Maternal deaths	*Control cases*	*Statistical significance*	*Maternal deaths*	*Control cases*	*Statistical significance*
1. Percentage of Hindus ..	90.10	89.70	P > .05	63.60	68.20	P > .05
2. Percentage of scheduled castes/tribes ..	76.00	85.10	P < .01	13.60	04.50	P > .05
3. Percentage in joint family ..	38.90	43.90	P < .05	45.50	36.40	P > .05
4. Average family size ..	05.58	06.84	P < .001	06.95	07.18	P > .05
5. Mean socio-economic status score ..	05.50	06.73	P < .001	06.50	06.60	P > .05
6. Percentage literate women ..	09.20	17.20	P < .01	27.30	18.20	P > .05
7. Percentage of women worked outside home for wages	42.40	41.60	P > .05	09.10	09.10	—
8. Percentage of literate husbands ..	35.10	46.90	P < .01	72.80	59.10	P > .05
9. Mean outside contact score ..	01.76	02.29	P < .001	03.36	03.95	P > .05
10. Mean age of women ..	25.05	24.71	P > .05	27.14	26.32	P > .05
11. Percentage of women (15 – 19) ..	19.10	10.30	P < .01	13.60	04.50	P > .05
12. Percentage of women (20 – 34) ..	68.70	86.20	P < .001	68.20	95.50	P < .05
13. Percentage of women (35 – 44) ..	12.20	03.40	P < .001	18.20	00.00	P < .05
14. Mean age of husband ..	32.50	31.20	P < .05	34.82	32.41	P > .05
15. Mean age at marriage ..	16.40	16.60	P > .05	16.50	16.14	P > .05
16. Mean age at first pregnancy ..	18.75	18.56	P > .05	19.14	19.05	P > .05
17. Mean no. of pregnancies ..	03.05	02.96	P > .05	03.55	03.32	P > .05
18. Percentage of women pregnancy order 1 ..	34.30	24.40	P < .05	27.30	04.50	P < .05
19. Percentage of women pregnancy order ≥ 7 ..	09.90	04.60	P < .05	04.50	00.00	P > .05
20. Mean no. of live births ..	02.54	02.85	P < .05	03.10	03.23	P > .05
21. Percentage of women birth order 1 ..	34.80	25.20	P < .05	26.30	09.00	P > .05
22. Mean no of still births ..	00.23	00.06	P < .001	00.23	00.09	P > .05
23. Mean no. of abortions ..	00.17	00.05	P < .01	00.14	00.00	P > .05

VARIABLE	RURAL (n = 262)			URBAN (n = 22)		
	Maternal deaths	*Control cases*	*Statistical significance*	*Maternal deaths*	*Control cases*	*Statistical significance*
24. Mean no. of living children ..	01.49	02.38	P < .001	02.36	02.86	P > .05
25. Proportion with atleast one son ..	45.40	75.20	P < .001			
26. Mean birth interval (months) ..	31.02	29.44	P > .05	29.59	30.59	P > .05
27. Mean interval last two births (months) ..	32.73	31.35	P > .05	32.73	33.82	P > .05
28. Percentage using government health facilities as usual source of treatment of illnesses ..	58.80	52.30	P < .05	54.50	40.90	P > .05
29. Percentage knowing existence of PHC ..	41.60	57.30	P < .001	—	—	—
30. Percentage ever visited PHC ..	80.70	60.00	P < .001	—	—	—
31. Percentage satisfied with PHC services ..	88.60	97.80	P < .05	—	—	—
32. Percentage knowing existence of sub-centre ..	67.20	75.20	P < .05	—	—	—
33. Percentage ever visited sub–centre ..	65.30	57.40	P > .05	—	—	—
34. Percentage satisfied with sub–centre services ..	93.00	93.80	P > .05	—	—	—
35. Percentage ever visited other govt. health facilities	98.50	93.50	P < .01	100.0	95.50	—
36. Percentage knowing female worker's domicillary visits	77.90	76.30	P > .05	—	—	—
37. Percentage knowing male worker's domicillary visits	80.20	78.20	P > .05	—	—	—
38. Percentage delivered at home ..	62.60	91.20	P < .001	27.30	86.40	P < .001
39. Percentage received trained assistance during delivery	31.00	33.20	P > .05	50.00	63.60	P > .05
40. Mean no. of complicated pregnancies ..	00.92	00.19	P < .001	00.73	00.45	P > .05
41. Percentage having predisposing health conditions ..	48.90	11.50	P < .001	50.00	18.20	P < .05
42. Mean no. of predisposing health conditions ..	00.57	00.14	P < .001	00.64	00.18	P < .05
43. Percentage having danger signals during pregnancy	58.00	07.60	P < .001	59.10	09.10	P < .001
44. Percentage registered for ante-natal care ..	45.40	66.40	P < .001	40.90	50.00	P > .05
45. Mean gestation period in months at which registered for ante-natal care ..	05.48	05.51	P > .05	05.40	07.80	P > .05
46. Mean no. of ante-natal visits ..	00.33	00.63	P < .01	01.14	01.09	P > .05
47. Mean no. of health worker's visits to woman's home	01.57	02.27	P < .001	00.00	00.18	P > .05
48. Percentage sought advise or assistance during pregnancy	12.60	08.00	P > .05	—	—	—

I. INTRODUCTION

1.1 The level of maternal mortality is a sensitive index of the prevailing health conditions and general socio-economic development of a community. Furthermore, it is a great social tragedy for the family which is completely shattered after the death of the woman, who in most developing countries, plays a significant role in the upbringing of children and management of family affairs.

1.2 The International Classification of Diseases defines a maternal death as follows :[1]

> "A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes."

1.3 In most developing countries, the women in the reproductive age group constitute a little more than one-fifths of the total population. These women are repeatedly exposed to pregnancy and child bearing and under the existing socio-economic conditions and inadequacy of medical and health facilities are under great risk of morbidity and mortality.

1.4 The levels of maternal mortality in most developing countries are not known. Whatever statistics are available they reveal that maternal mortality rates (MMR) in developing countries is many times more than the developed countries. For example, as against the world average of 351, the maternal mortality in North America is only 11 per 1,00,000 births. It is reported to be 522 for Asia which is highest for any region in the world.[2] The maternal deaths for India, according to different estimates, are reported to be about four per 1,000 births with considerable regional variations.[3-6] It has further been estimated that maternal deaths account for a little more than one per cent of the total deaths in India.[7]

1.5 Most estimates of MMR in India are based on fragmentory information, and that too only for a small section of the population. Even though vital registration system is well established in India, there is very high degree of under-registration of births and deaths and the rates obtained directly by using civil registration data do not provide adequate information on the level of maternal mortality. Moreover, even available evidence is not complete in terms of population coverage medical certification of causes of deaths and the classification procedures. Thus, the reported deaths constitute only a small fraction of the total maternal deaths.[8]

1.6 The hospital statistics on which many estimates are based are not representative sample of the total population since an overwhelming majority of deliveries in India, as in many other developing countries, are conducted by traditional birth attendants (TBA)[9-11].

1.7 It has also been reported that abortion related deaths constitute a major part of maternal mortality in India.[12] A number of attempts have been made in the past

to explore the extent of abortions, induced or spontaneous.[13-17] The studies also show that a large number of abortions are performed in the rural areas of India by unqualified medical practitioners and a large number of women continue to avail of their services even after the enactment of Medical Termination of Pregnancy Act under which abortions were liberalised.[18-19] The exclusion of abortions thus hampers any discussion on maternal mortality.

1.8 In the absence of adequate registration systems and non-certification of causes of deaths medically, there is very little information about the causes of maternal deaths. The only source of information in this regard are hospital statistics which, as already indicated, are not the representative sample of the overall pattern in the community. The information on social, cultural and behavioural factors contributing to maternal mortality is hardly available.

1.9 Even in countries where maternal mortality is very high, a maternal death is a rare event and a very large sample is required to estimate mortality rates with fair degree of accuracy and to analyse the causes of maternal mortality. The community maternal mortality studies are very rare.

1.10 Innovative approaches are therefore needed to find out the extent of maternal mortality and its causes both medical and non-medical, which could help initiate appropriate remedial measures for reduction of maternal deaths. It was under this background that the present study was sponsored by the World Health Organisation (WHO).

II. OBJECTIVES OF THE STUDY

2.1 The main objectives of the study are :

(*a*) To estimate levels of maternal mortality in an area of India based on the occurrence of such deaths in the whole community, whether in hospital or not over a reference period of one year.

(*b*) To find out causes of maternal deaths not only in clinical terms but also in terms of the avoidable factors in these deaths, both health services factors and socio-economic, socio-cultural or behavioural factors.

III. LOCATION OF THE STUDY

3.1 The study has been carried out in Anantapur district located in the Indian state of Andhra Pradesh. According to 1981 census the district had a population of about 2.6 million. The selection of the state and district was based on logistics and anticipated cooperation from the health department and not on any scientific sampling procedures which are not considered essential for an exploratory study like this.

3.2 This is one of the economically backward districts of the State. Since more than four-fifths of the population lives in the rural areas, the livelihood pattern

of the people is predominantly agro-based. The industrial development in the district is still at a nascent stage.

3.3 The medical facilities in the urban areas are made available through government hospitals located at the district and taluk headquarters. The primary health centres (PHCs) are responsible for providing medical and health care facilities to the rural population. All medical and health care institutions in the district except the district headquarters hospital are controlled by the District Health and Family Welfare Officer. The district hospital which has 450 beds is under the charge of a Civil Surgeon.

3.4 In order to strengthen health and family planning services through imaginative, innovative and replicable approaches, a Model Plan for creation of Facilities and Provision of Services under Area Programme was developed by the Government of India, Ministry of Health and Family Welfare in 1979. The plan is being implemented in many parts of the country with financial assistance from multi-lateral and bilateral agencies. In the state of Andhra Pradesh World Bank is providing necessary assistance to implement the model plan in three out of twenty one districts of the state and Anantapur is one of three districts covered under the scheme.

IV. SCOPE OF THE STUDY

4.1 The study has been divided into three main parts :

(*a*) Identification of cases of maternal deaths ;

(*b*) Investigation of causes of maternal deaths ;

(*c*) Case control study to determine characteristics of cases of maternal mortality (i.e., how women who die differ from those who do not).

4.2 The study covers both urban and rural areas of Anantapur district. The reference period used is 12 months i.e., July 1, 1984 to June 30, 1985.

V. MATERIALS AND METHODS

5.1 The principal investigator visited the state capital (Hyderabad) and discussed the objectives of the study with the Director of Health Services and other senior officers. All of them, particularly officers connected with the World Bank Project, evinced considerable interest in the study and offered to provide all possible assistance in the conduct of the study. The Director also sent an official communication to the District Health and Family Welfare Officer, Anantapur, requesting him to make necessary facilities available for carrying out the study. The principal investigator thereafter visited Anantapur and discussed in detail the objectives of the study and the proposed methodology of the study with the District Health Officer. The DHO assured his full cooperation and sent out official communications to all the health institutions and municipalities in the district requesting them to provide all available information to the study team.

5.2 After cooperation of the officials had been ensured, a team of six male interviewers and a male supervisor was recruited. All of them were non-medical persons having a bachelors degree and considerable prior experience of conducting health and family welfare surveys. They were trained by the principal investigator at Anantapur for seven days.

5.3 There are fifteen big and small hospitals in the district. The study team visited each hospital and collected information from the records maintained by these facilities about all the deaths relating to the women in the reproductive age group 15–49 during the reference period irrespective of the ward in which the death had taken place. During the initial stages the principal investigator also accompanied the team. A few characteristics of the deceased women such as : name, husband's name, age, religion, occupation of the husband, permanent address, ward in which admitted, causes of death, date of admission and death were also collected. In addition, case sheets of these women were obtained from hospital records and copied. The medical records and the case sheets were evaluated with the help of medical professionals and the women who died of maternal causes were identified.

5.4 Information regarding deaths to the women in the age group 15–49 along with their identifying characteristics was also obtained from the death certificates obtained from the civil registration authorities. Each such case of death was matched with the hospital records and additional deaths were thus identified. All additional cases of deaths where the cause of death recorded could be clearly attributed to complications of pregnancy, child birth and pueraparium were taken to be maternal deaths.

5.5 The government health services in the rural areas are provided through a network of primary health centres (PHCs). Each PHC covers a population of approximately 1,00,000 residing in 100–250 villages and spread over an area of 150–200 square miles. In order to make the basic health services easily accessible to the people, there is a sub-centre (SC) for each 5,000 population. There are 22 PHCs in the district and all were included in the study. The study team visited each PHC and interviewed different categories of health personnel to identify deaths to the women in the age group 15–49 in their respective areas.

5.6 A sample of 50 per cent of the Sub-centres under each PHC was selected for visit by the study team. The Sub-centres are expected to maintain records of all births and deaths occuring to the people residing within their jurisdiction. The records maintained by these facilities were examined and all deaths relating to the women in the reproductive age group during the reference period were noted down. The Sub-centre staff was also interviewed to identify additional events.

5.7 The field interviewers then visited the houses of deceased women and made detailed enquiries about the cause of death, particularly to find out if the women was pregnant at the time of death or had delivered a child 42 days before death. The results of these investigations were recorded for each case.

5.8 All villages and hamlets covered by the Sub-centres in the sample were also visited by the field interviewers. Knowledgeable persons such as opinion leaders,

school teachers, medical practitioners, traditional birth attendants, revenue officials and other workers of development departments, village watchmen, etc., were contacted to enquire about deaths to women in the reproductive age group during the reference period. The field interviewers also visited the village school and made enquiries from the children about the deaths and this proved to be very useful source of information about this vital event. The details about the cause of death for all these additional events so identified were collected by interviewing a responsible member of the household of the deceased woman.

5.9 The information about births during the reference period was collected from the civil registration systems and records of vital events maintained by health facilities.

5.10 For carrying out detailed survey of all identified maternal deaths and controls, an interview schedule was developed (See Appendix). The schedule was pretested on 25 cases in the villages outside the sample. The data collected was evaluated and necessary modifications and revisions were carried out.

5.11 The control cases were randomly selected for each village from the list of women who gave birth during the reference period and survived. For urban areas the control cases were randomly selected from a list of births obtained from the hospital records. The number of controls equalled the number of maternal deaths identified.

5.12 For the purpose of carrying out detailed interviews, the interviewers visited the houses of the deceased women again and interviewed the household members of the deceased woman, preferably the husband. For controls, every possible attempt was made to interview the woman herself, failing which other responsible member of the household preferably the husband was interviewed.

5.13 The amount of field work involved in this study has been enormous. During the first phase of the study, the interviewers visited sixteen hospitals and municipal offices in small and big towns covering a total urban population of 5,69,500. In the rural areas they visited 22 PHC headquarter villages, 181 villages where sub-centres were located and 1,192 other villages spread all over the district and comprising a total rural population of 10,90,640 (47.3% of the total rural population of the district). During the second phase of the study the interviewers again visited all the towns in the urban areas and 10 PHC villages, 65 sub-centre villages and 135 other villages to carry out detailed interviews for maternal deaths as well as control cases.

5.14 The interview schedules were examined by an experienced and qualified obstetrician gynaecologist from the state to :

(*a*) classify obstetric cause of death ;
(*b*) classify clinical cause of death ;
(*c*) found out if the death was preventable ;
(*d*) what steps should have been taken to prevent the death.

5.15 The data has been processed, coded and tabulated manually. The statistical tests of significance have been performed wherever necessary.

VI. FINDINGS : LEVELS OF MATERNAL MORTALITY

6.1 Age distribution of deaths in the reproductive age group (all causes) :

A total of 1,073 deaths — 867 in the rural areas and 206 in the urban areas were identified. The age distribution of these deaths shows that more than one-half (52.5%) of the deceased women were below the age of 30 years. This represents a tragic loss as a large number of female adults died at the peak of their family responsibilities. No rural urban differentials in the age pattern of these deaths are discernible from the date (TABLE 1).

6.2 Age distribution of maternal deaths :

On the basis of evaluation of data on causes of deaths collected through hospital case sheets and enquiries from the families of the deceased women, a total of 391 deaths — 333 in rural areas and 58 in urban areas — could be attributed to complications of pregnancy, child birth and pueraparium. The age distribution of these deaths reveals that 70 per cent of the deaths occured to women below the age of 30, Furthermore, about one-thirds (31.7%) of the total maternal deaths were reported for the women in the age group 20–24 (TABLE 2).

6.3 Recorded deaths in the reproductive age group (all causes) by type of village :

In the rural areas a sub-centre covers a population of 5000 and is staffed by a male and female worker. They are required to maintain a complete record of all births and deaths in their respective areas. The proportion of total deaths identified by us which were found in health facility records indicates that less than one-half (44.6%) of the identified deaths in the reproductive age group 15–49 were found in the records. It is revealing that inspite of a small population a sub-centre serves and regular domicillary visits health workers are supposed to make, a majority of deaths were missed by them. Furthermore, health workers reside in the PHC and sub-centre villages and it could be assumed that more such events would be picked up by them at least in the villages of their residence. The analysis however shows that there are no statistically significant differentials in the registration of deaths according to type of village.

($\chi^2 = 1.35$; $P > .05$) (TABLE 3).

6.4 Recorded deaths in the reproductive age group (all causes) by age of woman :

A significantly higher proportion of deaths in the age group 15–24 (64.3%) as compared to age group 25–49 (50.7%) were missed by the health workers. These differences are statistically significant ($\chi^2 = 15.03$; $P < .001$) (TABLE 4).

6.5 Recorded maternal deaths by type of village :

It is revealing that only one-thirds (34.5%) of the maternal deaths identified were found in the health records maintained by sub-centres. An analysis by type of village reveal no significant differentials ($\chi^2 = 0.92$; $P > .05$). The finding that approximately two-thirds (65.5%) of the maternal deaths were missed by the health workers may be viewed against the fact that health centres are required

to maintain a complete record of eligible couples and pregnant women for providing family planning and MCH services. When such a substantial proportion of pregnant women are not even recorded, the health services coverage obviously remains low (TABLE 5).

6.6 Recorded maternal deaths by age of woman :

There were small number of maternal deaths in the age group 40–49 which were mostly recorded. If we exclude this group and compare the age groups 15–24 and 25–39, it becomes apparent that a substantially larger proportion (74.7%) of maternal deaths in the age group 15–24 were missed by the health workers as against 59.3% in the age group 25–39. These differences are statistically significant ($\chi^2 = 7.96$; $P < .01$) (TABLE 6).

6.7 Levels of maternal mortality :

The levels of maternal mortality in this study have been studied by two different measures, i.e., maternal deaths per 1,000 live births and maternal deaths per 10,000 women in the reproductive age group. We will call the former as ratio and later as rate. In the population covered by the study we identified 58 maternal deaths in the urban and 333 in the rural areas. Based on this data, the total maternal deaths have been projected for the 1985 urban and rural population of the district. The information about births collected from civil registration systems and records of vital events maintained by the health facilities was found to be grossly under reported. A detailed sample survey was conducted in 1981 in the district by the World Bank assisted project both in the urban and rural areas. The data from this survey has been used for estimating births to be used as a denominator.[20] As could be seen from TABLE 7, the maternal mortality ratio for the entire district works out to be 7.98 ; 5.45 for the urban and 8.30 for the rural areas. As already indicated, the results of 1981 fertility survey have been used for estimating the births. The project officials believe that there has been a decline in the fertility during the last couple of years due to intensive family planning activities undertaken by the project. If current estimates of births, for which reliable data is not available, are used for the denominator the ratio is likely to be higher than reported here. Thus the levels of maternal mortality shown in the table appear to be an underestimate of the magnitude of maternal mortality in the district (TABLE 7).

6.8 Age specific maternal mortality ratio :

The total number of births in each age group have been estimated by using age specific fertility data collected by the World Bank assisted project and used as denominator for calculating age specific maternal mortality ratios. The results show that in the urban areas the age specific maternal mortality ratios are highest in the age group 40–44 (17.86) and lowest in the age group 15–19 (1.31). But in the rural areas these are highest in the age groups 35–39 (13.27) and lowest in the age group (45–49). No clear trend about the incidence of maternal mortality at various ages is however discernible from the data (TABLE 8).

6.9 Age specific maternal mortality rates :

The maternal mortality rates (maternal deaths per 10,000 women aged 15–49) works out to be 12.0 for the entire sample with significant rural-urban differentials

(14.2 for rural against 4.1 for urban areas). The age specific rates discern no clear trend in the extent of maternal mortality according to age of the woman (TABLE 9).

6.10 Contribution of maternal mortality to total female mortality in the age group 15-49 :

The percentage of maternal deaths to deaths from all causes in the age group 15–49 have been compiled. The analysis show that the contribution of maternal deaths to total female mortality in the reproductive age group is very high (36.4%) in this study. Furthermore, there are significant rural urban differentials in this regard. While in the urban areas 28.2% of the total female deaths in the reproductive age group are due to maternal causes, the corresponding percentage for the rural areas works out to be 38.4. Rural-urban differentials in the pattern of this contribution by various age groups are also apparent. While no clear pattern is discernible for the urban areas, in the rural areas consistently about one-half of the female deaths in the age 15 to 29 are attributable to complications of pregnancy and child birth. The maternal mortality thus appear to be leading cause of death for females in the reproductive age group. The probability of dying due to pregnancy is not only high at each age, it is spread over a much longer period of their reproductive lives (TABLE 10).

6.11 Levels of maternal mortality by developing status of the village :

In order to find out the effect of rural development on maternal mortality, a village development index was developed based on the following variables : (i) location of the village ; (ii) condition of road to sub-centre ; (iii) condition of road to PHC ; (iv) condition of road to nearest town ; (v) distance to nearest town ; (vi) distance to nearest railway station ; (vii) distance to nearest bus station ; (viii) existence of educational institutions in the village ; (ix) electricity in the village ; (x) private medical practitioners in the village, and (xi) existence of post office in the village. Each village was assigned a score (maximum 45). All villages covered by the study were divided into four categories : Poorly developed (score 0–10), somewhat developed (score 11–20), adequately developed (score 21–30) and highly developed (score > 30). The maternal mortality ratios and rates have been calculated for each set of village. The analysis indicates that there is a consistent relationship between level of maternal mortality, and development status of the village, the rates being more than four times in poorly developed villages as compared to highly developed villages (TABLE 11).

6.12 Levels of maternal mortality by distance from health facilities :

An attempt has been made to find out the variations in the level of maternal mortality according to the distance of the village from the rural health facilities. The available information reveals that levels of maternal mortality are lowest in the village where PHCs are located. The villages where sub-centres are located also have lower rates as compared to villages where no such facilities are located. However, there are no significant differences in the levels of maternal mortality in the villages which are > 5 kms from PHC and those < 5 from kms from PHC (TABLE 12).

VII. PREGNANCY OUTCOME AND CAUSES OF MATERNAL DEATHS

7.1 Outcome of latest pregnancy :

Out of 284 women for which detailed information was collected 62.3% resulted in live births, 14.1% in still births, 10.1% in abortions and the remaining 12.7% did not deliver. The proportion of abortions and not delivered cases are higher in the urban than in the rural areas, but there are more still births in the rural areas as compared to urban areas (TABLE 13).

7.2 Type of delivery :

A little more than one-half deliveries are reported to be normal, while in approximately one-fifths of the cases, the labour was prolonged. The remaining about one-fourths of women either did not deliver or pregnancies resulted in abortions. The proportion of women with prolonged labour is higher in rural than in urban areas (TABLE 14).

7.3 Place of occurence of death :

Approximately two-fifths (40.9%) of deaths occured at home and about one-twelfth (8.5 %) of the women died on way to hospital. Of the deaths which took place in the hospitals, an overwhelming majority occured in government health institutions. The belief that pregnant women in emergency are able to reach hospitals, though in morbid condition, is not supported by this study (TABLE 15).

7.4 Family's awareness of seriousness of patient's condition :

A question was asked to the family members if they became aware of seriousness of patient's condition and what steps were taken by them to save the life of the woman. A little more than one-fifths (22.2%) of the respondents indicated that they did not compreheand the seriousness of patient's condition. Of the remaining families who knew the condition of the patient, a small proportion did not take any action, while a large majority took necessary steps either to call the health worker/doctor home or take the patient to hospital (TABLE 16).

7.5 Gestation period at death :

The mean gestation at death works out to be 33.6 weeks and there are no rural-urban differentials. About one-sixths (15.8%) of the women had 28 weeks of pregnancy at the time of death (TABLE 17).

7.6 Time interval between delivery and death :

A little less than one-half (45.5%) of the women died on the day they delivered, while about one-eighths (13.0%) died more than 15 days after. The mean interval between delivery and death works out to be 6.93 days with significant rural-urban differentials. While average time lapse for rural women is 7.3 days, it is only 2.5 days for urban sample (TABLE 18).

7.7 Stage of occurence :

The percentage of ante-partum, intra-partum and post-partum deaths works out to be 19.0, 11.6 and 69.4 respectively. While there are no significant rural-urban differentials in post-partum deaths, ante-partum deaths are much higher in urban than in rural areas (TABLE 19).

7.8 Obstetric causes of maternal deaths :

About two-thirds (66.9%) of deaths are due to direct obstetric causes and the remaining one-thirds (33.1%) due to indirect causes. There appears to be significant rural-urban differences in this regard. While in the rural areas 67.9% of the deaths are due to direct obstetric causes, the corresponding percentage for urban areas works out to be 90.9 (TABLE 20).

7.9 Clinical causes of maternal deaths :

The major clinical causes of maternal mortality are : sepsis (36.0%), haemorrhage (12.3%), eclampsia (9.2%), retention of placenta (7.2%). The main associated causes are : infective hepatitis (9.8%) and severe anaemia of pregnancy — 9.2% (TABLE 21).

7.10 Main clinical causes for maternal deaths by age :

It would be interesting to compare the causes of deaths with different age groups. The data shows that deaths due to abortions, anaemia and other associated causes are proportionately higher in age group 30–44 as compared to age group 15–29 (TABLE 22).

7.11 Main clinical causes of deaths by number of live births :

A similar analysis for number of live births indicates that number of deaths due to abortions, anaemia and other associated causes are significantly higher at parity 4 + as compared to parity 0–3. Most abortions at parity 4 + are induced, apparently due to unwanted pregnancies (TABLE 23).

VIII. COMPARISON OF CHARACTERISTICS OF MATERNAL DEATHS AND CONTROL CASES IN RURAL AREAS

8.1 Religion :

The data collected regarding the religious affiliation of the women reveals that 90.1% of the women who died and 89.7% who survived child birth belonged to Hindu religion. The differences are not statistically significant. ($\chi^2 = 0.02$; $P > .5$) (TABLE 24).

8.2 Caste :

The caste plays an important role in Indian social system. The scheduled castes/tribes belong to socially and economically weaker sections of the society and

special privileges have been guaranteed to them under the Constitution of India. In our survey while 24.0% of the women who died belonged to scheduled castes/tribes, the corresponding percentage for control cases works out to be 14.9. These differences are statistically significant ($\chi^2 = 7.01$; $P < .01$) (TABLE 25).

8.3 Family type :

Information regarding type of family in which the women lived indicates that 38.9% of women who died and 43.9% of those who survived lived in joint families. These differences are statistically not significant ($\chi^2 = 1.33$; $P > .05$) (TABLE 26).

8.4 Family size :

The average family size of maternal deaths and controlled cases works out to be 5.58 and 6.84 respectively. While 27.1% of the women who died had a family size of less than three, the corresponding percentage for control cases works out to be 8.0. These differences are statistically significant ($t = 4.67$; $P < .01$) (TABLE 27).

8.5 Socio–economic status :

A socio-economic index was developed based on the following variables : housing condition, electricity, possession of land, occupational status. All the households were divided into three categories i.e., higher, middle and poor. The analysis shows that 69.1% of the women who died as against 37.0% who survived belonged to poor families. There are thus significant socio-economic differences between the maternal deaths and control cases ($\chi^2 = 55.8$; $P < .0001$) (TABLE 28).

8.6 Literacy status of woman :

The number of literate women among the controls is twice that of the women who died. The differences are statistically significant ($\chi^2 = 7.4$; $P < .01$) (TABLE 29).

8.7 Occupational status of women :

There are no significant differences in the occupational status of women who died and those who survived child birth ($\chi^2 = 0.03$; $P < .05$) (TABLE 30).

8.8 Educational status of woman's husband :

The husbands of women who survived have significantly higher education as compared to those of the women who died ($\chi^2 = 10.2$) ; $P < .01$) (TABLE 31).

8.9 Family's contact with outside world :

A communication index was developed and all families were divided into poor, fair and good. The families of the women who survived have been found to have better contacts with the outside world as compared to the families of women who died. The differences are statistically significant ($\chi^2 = 17.0$; $P < .01$) (TABLE 32).

8.10 Maternal age :

The mean age for women who died and those who survived works out to be 25.65 and 24.71 years respectively. Those differences are statistically not significant ($t = 0.24865$; $P > .05$). Further analysis, however, reveals that proportion of women in the younger (15–19) and higher ages (35–44) is significantly higher among those who died as compared to control cases. A larger proportion of women who survived are in age group of 20–34 as compared to women who died.

χ^2 (15–19 V/s rest) = 8.04 ; $P < .01$
χ^2 (20–34 V/s rest) = 23.10 ; $P < .001$; and
χ^2 (35–44 V/s rest) = 14.00 ; $P < .001$
(TABLE 33).

8.11 Husband's age :

The mean ages of husbands of women who died and control cases works out to be 32.5 and 31.2 years respectively. Thus the husbands of women who died are older than those who survived. These differences are statistically significant ($t = 2.28$; $P < .05$) (TABLE 34).

8.12 Age at marriage :

The mean age at marriage for maternal deaths and control cases works out to be 16.4 and 16.6 respectively. This is not significantly different ($t = -1.30$; $P > .05$) (TABLE 35).

8.13 Age at first pregnancy :

The women who died had their first pregnancy at an average age of 18.75 as against 18.56 for women who survived. These differences are not statistically significant ($t = 1.02$; $P > .05$) (TABLE 36).

8.14 Number of pregnancies :

The mean number of pregnancies for maternal death and control cases works out to be 3.05 and 2.96 respectively. The difference is marginal and not significant ($t = 0.497$; $P > .05$). Further analysis however reveals that a higher proportion of women who died became pregnant for the first time as compared to the women who survived ($\chi^2 = 6.22$; $P < .05$). Similarly more women who died had 7 or more pregnancies as compared to controls ($\chi^2 = 5.55$; $P < .05$). Thus, at both extremes the women who died outnumbered those who survived (TABLE 37).

8.15 Number of live births :

The mean number of live births for maternal death and control cases works out to be 2.54 and 2.85 respectively and these differences are statistically not significant. ($t = 1.8485$; $P > .05$). Further analysis however shows that there are more women with first birth order among those who died as compared to control cases and this difference is statistically significant ($\chi^2 = 5.57$; $P < .05$) (TABLE 38).

8.16 Number of still-births :

The mean number of still births for maternal death and control cases works out to be 0.23 and 0.06 respectively. These difierences are statistically significant ($t = 4.426$; $P < .001$).

8.17 Number of prior abortions :

A significantly higher proportion of women who died experienced prior abortions as compared to controls. The mean number of prior abortions for maternal death and control cases works out to be 0.17 and 0.05 respectively. These differences are statistically significant. ($t = 3.2137$; $P < .01$) (TABLE 40).

.18 Number of living children :

The women who died had an average of 1.49 children as against 2.38 for control cases. This difference is statistically significant ($t = 6.70$; $P < .001$). It may be interesting to note here that while the women who died had more pregnancies as compared to controls, the number of living children is much lower for the former. Thus the women who died lost more pregnancies and children as compared to controls (TABLE 41).

8.19 Number of living sons :

In India the desire for a male child is well known and is documented by many studies[21]. The prestige of a women in a family and among her relations depends considerably upon the number of male children she bears. The couples are there fore reluctant to use family planning methods unless they have at least one surviving son. The data about practice of contraception was not collected in this study. However, it can be safely assumed that under Indian rural conditions the couples who do not have at least one living male child will not be using contraception. The number of male children can therefore be used as a proxy for use of contraception. Our analysis reveals that 54.9% of the women who died as against 24.9% who survived child births did not have at least one living male child. The mean number of male children for both these groups works out to be 0.76 and 1.89 respectively. The differences are statistically significant. χ^2 (0 V/S $\geq$ 1) = 48.5 ; $P < .01$) (TABLE 42).

8.20 Birth interval :

The average birth interval has been found to be 31.02 and 29.74 months for the maternal deaths and control cases respectively. The difference between these two groups of women is statistically not different. ($t = 1.2487$; $P > .05$) (TABLE 43).

8.21 Birth interval between last two births :

The mean birth interval between last two births for the women who died and survived has also not been significantly different. The respective means works out to be 32.73 and 31.35 months ($t = 1.0884$; $P > .05$) (TABLE 44).

8.22 Usual source of treatment of illness in the family :

A little more than one half (52.3%) of the families reported to be using government sources of medical care for illnesses in the family, while the remaining about one-half patronise private medical practitioners either in the village or outside. No statistically significant differences have been found in this regard between the families where women died and those who survived child birth ($\chi^2 = 2.23$; $P > .05$) (TABLE 45).

8.23 Knowledge about location of primary health centre (PHC) :

Approximately three-fifths of the families in which maternal death occured and two-fifths of the families where women survived child birth did not know the location of the PHC. Thus, the knowledge about PHC location has been found to be significantly better for control cases as compared to maternal death cases ($\chi^2 = 12.83$; $P < .001$) (TABLE 46).

8.24 Visit to primary health centre (PHC) :

The families who could correctly specify the location of PHC were further asked a question if any member of the family had ever visited PHC. More members of families where maternal deaths occured as compared to control cases had visited PHC at least once. These differences are statistically significant ($\chi^2 = 12.45$; $P < .001$) (TABLE 47).

8.25 Satisfaction with PHC services :

As regards satisfaction from PHC services more families of control cases as compared to maternal death cases reported to be satisfied. The differences are statistically significant ($\chi^2 = 5.72$; $P < .05$) (TABLE 48).

8.26 Knowledge of location of sub-centre (SC) :

A significantly higher proportion of families where women survived as compared to those where women died due to child birth knew the location of sub-centre. ($\chi^2 = 4.10$; $P < .05$) (TABLE 49).

8.27 Visit to sub-centre :

The proportion of families who visited the sub-centre at least once has not been found to be significantly different for these two groups i.e., maternal deaths and controls. ($\chi^2 = 2.22$; $P > .05$) (TABLE 50).

8.28 Satisfaction with sub-centre services :

As regards satisfaction with the services received from the sub-centre services, the differences have not been found to be significant between the two groups. ($\chi^2 = 0.01$; $P > .05$) (TABLE 51).

8.29 Visit to other government facilities :

An overwhelming majority of families indicated that they had visited at least once other governmental health facilities. The proportion is significantly higher for maternal death cases as compared to controls. ($\chi^2 = 8.3$; $P < .01$) (TABLE 52).

8.30 Knowledge of female health workers domicillary visits :

The female health workers are required to visit the village at least twice a month. They are particularly required to visit the houses of pregnant and recently delivered women for providing MCH services. Approximately three-fourths of the respondents from both groups indicated that they knew of these visits. The differences are statistically not significant. ($\chi^2 = 0.17$; $P > .05$) (TABLE 53).

8.31 Knowledge of male health workers domicillary visits :

The male workers are also supposed to visit each village house once in two weeks to enquire about the health status of the family, collection of vital events and provisions of various health services. Here again approximately four-fifths of the families knew about these visits and the differences between the two groups are statistically not significant. ($\chi^2 = 0.29$; $P > .05$) (TABLE 54).

8.32 Place of Delivery :

The percentage of women who delivered at home works out to 91.2 and 62.6 for maternal death and control groups respectively. Thus a significantly higher proportion of women who died had no institutional delivery as compared to women who survived. The differences are statistically significant. ($\chi^2 = 31.69$; $P < .001$) (TABLE 55).

8.33 Assistance during delivery :

The proportion of women who received trained assistance during delivery has not been found to be significantly different for two groups of women. ($\chi^2 = 0.25$; $P > .05$) (TABLE 56).

8.34 Number of complications/problems during previous pregnancies :

The average number of problem pregnancies for women who died works out to be 0.92 while the corresponding mean for women who survived is 0.19. These differences are highly significant ($t = 9.3248$; $P < .001$) (TABLE 57)

8.35 Presence of predisposing health conditions :

About one-half (48.9%) the women who died had predisposing health conditions such as anaemia, hepatitis, hypertension etc., which complicated the pregnancies. These predisposing health conditions were reported only in 11.5% of the women who survived child birth. The differences are statistically significant. ($\chi^2 = 45.0$; $P < .001$) (TABLE 58).

8.36 Number of predisposing health conditions :

On an average the women who died had 0.57 predisposing conditions as compared to 0.14 for control groups. The differences are significant. ($t = 8.7084$; $P < .01$) (TABLE 59).

8.37 Presence of danger signals during pregnancy :

Approximately three-fifths (58.0%) of the women who died showed danger signals such as excessive bleeding, high fever, eclamptic fits, etc. during pregnancy. The number of women who survived child birth and indicating such danger signals is only marginal (7.6%). The differences in the two groups are thus highly significant. ($\chi^2 = 150.8$; $P < .001$) (TABLE 60).

8.38 Registration for ante-natal care :

Approximately two-thirds (66.14%) of the women who survived registered for ante-natal care at the SC/PHC as against less than one-half (45.4%) of the women who died of maternal causes. The differences are statistically significant. ($\alpha^2 = 23.4$; $P < .001$) (TABLE 61).

8.39 Gestation period at which registered for ante-natal care :

The mean gestation period at which the two-groups of women — those who died and those who survived — registered for ante-natal care works out to be 5.48 and 5.51 months respectively. The difference is only marginal and is not significant. ($t = -0.277$; $P > .05$).

8.40 Number of ante-natal visits :

The average number of ante-natal visits for women who died and those who survived works out to be 0.33 and 0.63 respectively. The women in the control group thus made significantly higher number of ante-natal visits as compared to women who died of maternal causes. ($t = 3.316$; $P < .01$) (TABLE 63).

8.41 Health worker's visits to women's home :

On an average the health workers made more visits to women who survived (2.27) as compared to women who died (1.57). These differences are highly significant. ($t = 4.456$; $P < .01$) (TABLE 64).

8.42 Advise or help sought during pregnancy :

There are no statistically significant differences in the maternal death cases and controls with regard to special advise or help sought for problems during pregnancy. ($\chi^2 = 2.98$; $P > .05$) (TABLE 65).

IX. COMPARISON OF CHARACTERISTICS OF MATERNAL DEATHS AND CONTROL CASES IN URBAN AREAS

9.1 In the urban areas detailed investigations could be carried out only in 22 out of 58 maternal death cases identified because many of the addresses obtained from the hospitals and municipal records were found to be incomplete. Thus, many houses could not be located. Thirty eight socio-economic, demographic and health behaviour related characteristics of maternal deaths and control cases have been compared. The following characteristics have been found to be significantly different : (*i*) pregnancy order ; (*ii*) predisposing health conditions ; (*iii*) danger signals during pregnancy, and (*iv*) number of male living children. There are differences in these two groups with regard to many other characteristics but the sample size is too small to draw any definite inferences. (TABLE 66).

X. PREVENTABILITY OF MATERNAL DEATHS

10. After examining the information collected for each maternal death during the detailed survey, the expert obstetrician–gynaecologist came to the conclusion that 40.8% of the deaths were definitely preventable, 37.0% possibly preventable and the remaining 22.2% were not preventable. (TABLE 67). According to her opinion, based on the available information, the deaths could have been prevented by taking the following steps :

Step required	*No. of cases*	*Percentage*
1. Proper early ante-natal care	18	8.1
2. TT Immunization	6	2.7
3. Treatment of anaemia during pregnancy ..	26	11.8
4. Treatment of hapatitis	7	3.2
5. Institutional delivery	18	8.1
6. Blood transfusion	18	8.1
7. Control of infection through broad spectrum antibiotics	44	19.9
8. Early shifting of the patient to hospital and proper treatment	42	19.0
9. Avoidance of pregnancy through family planning and treatment of hypertension	7	3.2
10. MTP by qualified doctor	18	8.1
11. Early ceassarian section	7	3.2
12. Control of dehydration through fluid ..	10	4.5
TOTAL	**221**	**99.9**

XI. DISCUSSION AND CONCLUSIONS

11.1 The present study indicates that there are 7.98 maternal deaths per 1000 live births in a southern area of India. These estimates are much higher than those reported by other studies in India. Most of the earlier estimates are based on hospital statistics, but according to this study majority of maternal deaths, particularly in the rural areas, occur at home or on way to hospital. Thus under Indian conditions any study based only on hopsital records is likely to give a distorted account of the magnitude of maternal mortality. Furthermore, social, economic, cultural, behavioural and health services accessibility factors contributing to maternal mortality may be different for the women who die in the hospital and those who die at home.

11.2 The vital event records maintained by the rural health institutions are also not complete. Of the total events identified by us only 44.6% of the deaths to women in the reproductive age group and 34.5% of maternal deaths were found in the records.

11.3 Detailed community surveys are therefore essential to determine with a fair degree of accuracy, the mangitude of maternal mortality. The survey needs to be carried out over a large area to identify enough number of maternal deaths for meaningful estimation and statistical analysis of causes of maternal mortality not only in clinical terms but also in terms of demographic, social, economic, cultural, behavioural and health accessibility factors contributing to maternal mortality. Such studies, if carried out imaginatively and using innovative approaches, can generate wealth of information useful for health planners and administrators for initiating necessary steps for reduction of maternal mortality. Such studies, as has been demonstrated by the present study, can be conducted at a modest cost which most developing countries can afford.

11.4 The contribution of maternal deaths to total female mortality in the reproductive age group has been found to be very high (36.4%) in this study. The maternal mortality thus appear to be a leading cause of death tor females and its prevention can bring about significant drop in female death rates.

11.5 There are not only rural-urban variations in maternal mortality, the intra-rural differentials are also apparent from this study. The levels of maternal mortality are four times higher in poorly developed villages as compared to highly developed villages. Thus integrated rural development and improving village infra-structure can go a long way in preventing or reducing maternal deaths.

11.6 The study has revealed that more than one-half (55.4%) of deaths in the reproductive age group and two-thirds (65.5%) of maternal deaths were not recorded by the health workers. The registration of vital events needs to be improved by proper motivation, training and supervision of primary health workers who are charged with the responsibility of maintaining complete records of births and deaths in their respective areas.

11.7 About two-thirds (66.9%) of deaths have been classified as due to direct obstetric while the remaining one-third (33.1%) due to indirect causes. The major clinical

causes of maternal mortality have been found to be sepsis (36.0%), haemmorrhage (12.3%), eclampsia (9.2%), retention of placenta (7.2%), infective hepatitis (9.8%) and severe anaemia of pregnancy (9.8%). More than three-fourths (77.8%) of deaths could have been prevented by early ante-natal care, treatment of predisposing health conditions, timely availability of medical care and hospitalisation.

11.8 The role of timely availability of transport for evacuating the patient to the nearest hospital is clearly evident from this study. Out of 149 women who were taken to the hospital in a serious condition, 96 (68.5%) were transported by public bus, 27 (19.2%) by bullock cart, 5 (3.5%) by manually driven rickshaw and only 12 (8.6%) of the remaining women were taken to the hospital in motor driven vehicle or ambulance. This resulted in considerable delay and consequently 24 women died on the way and another 54 died immediately after reaching the hospital.

11.9 The study also bring out the importance of registering all pregnant women and providing them adequate ante-natal services. In this study less than one-half (45.5%) of the women who died of maternal causes were registered and they on an average made only 0.33 visits to the sub-centre/PHC for ante-natal care. This needs to be improved in the light of the fact that a female health worker at the sub-centre covers only a population of 5,000 and is required to provide services to approximately 150 pregnant women in a year. This required education of the women and their families and proper training, motivation, guidance and supervision of the Health Workers at the peripheral level.

11.10 Many women who died had predisposing health conditions and indicated some danger signals during pregnancy. Their lives could have been saved if proper referral systems and feedback mechanism were in existence. In fact, 28 women had visited PHC/Hospital for treatment of various problems, but died for not following the advise treatment.

11.11 A large number of women had history of repeated still births and abortions. These women were at high risk of dying of maternal causes and a risk approach in identifying them and providing them required care would have been very useful.

11.12 Twenty seven women died due to abortions, most of which were induced due to unwanted pregnancies. Many of these lives could have been saved if the abortions had been performed by qualified medical personnel. Although the abortion has been liberalised in India, many rural women are not aware of it and location of facilities where MTP services are available. They are, therefore obliged to go to unqualified medical practitioners for the termination of unwanted pregnancies, thereby endangering their lives. A rigorous health education campaign is therefore needed to make people aware of the MTP Act and the facilities available thereunder.

11.13 One-third (34.3%) of the women died during their pregnancy and another one tenths (9.9%) and seven or more pregnancies. These women are at high risk and should thus be identified and provided proper ante-natal care. The high parity women and women having predisposing conditions should also be motivated to avoid pregnancy by adopting contraception.

11.14 Literacy of the women and her husband, as has been documented by this study, plays an important role in the prevention of maternal mortality. Improvements in formal education, particularly of girls, will help bring about perceptible decline in maternal mortality.

11.15 The improvement in socio-economic status of families will help in the reduction of maternal mortality. However, this is a long term strategy and in the short run, the women belonging to lower economic status or weaker section of the society should be identified and provided needed health care as a special target group.

11.16 It is ironical that although the primary health centres (PHCs) have been in existence for the last more than three decades, many rural people are not even aware of these facilities. Furthermore, their utilisation by the community has been rather poor. There is a need to make people aware of the availability of health services and improve the efficiency and effectiveness of these services through proper management.

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TABLE — 1

DISTRIBUTION OF FEMALE DEATHS IN THE AGE GROUP 15–49 IDENTIFIED IN THE RURAL AND URBAN AREAS OF ANANTHAPUR DISTRICT, INDIA BY AGE OF WOMAN

Age of woman	Rural		Urban		Combined	
	No.	%	*No.*	%	*No.*	%
15–19	103	11.9	22	10.7	125	11.6
20–24	197	22.7	43	20.9	240	22.4
25–29	166	19.1	32	15.5	198	18.5
30–34	133	15.3	35	17.0	168	15.7
35–39	99	11.4	27	13.1	126	11.7
40–44	76	8.8	17	8.3	93	8.7
45–49	93	10.7	30	14.6	123	11.5
TOTAL :	867	99.9	206	100.1	1073	100.1

TABLE — 2

DISTRIBUTION OF MATERNAL DEATHS IDENTIFIED IN RURAL AND URBAN AREAS OF ANANTHAPUR DISTRICT, INDIA BY AGE OF WOMAN

Age of woman	Rural		Urban		Combined	
	No.	%	*No.*	%	*No.*	%
15–19	49	14.7	11	19.0	60	15.3
20–24	105	31.5	19	32.7	124	31.7
25–29	82	24.6	8	13.8	90	23.0
30–34	55	16.5	12	20.7	67	17.1
35–39	35	10.5	5	8.6	40	10.2
40–44	6	1.8	3	5.2	9	2.3
45–49	1	0.3	—	—	1	0.3
TOTAL :	333	99.9	58	100.0	391	99.9

TABLE — 3

RECORDED TOTAL FEMALE DEATHS 15–49 (ALL CAUSES) AS PROPORTION OF FEMALE TOTAL DEATHS (15–49) IN RURAL AREAS OF ANANTAPUR DISTRICT, INDIA BY TYPE OF VILLAGE :

Type of Village	Total female deaths (15–49)				
	No. of total deaths	*No. of recorded deaths in health facility records*	*Percentage*	*No. of additional deaths identified*	*Percentage*
PHC Main villages	53	26	49.1	27	50.9
Sub-centre village	282	133	47.2	149	52.8
Other villages	532	228	42.9	304	57.1
TOTAL :	867	387	44.6	480	55.4

$\chi^2 = 1.35$ $P > .05$

TABLE — 4

RECORDED TOTAL FEMALE DEATHS (ALL CAUSES) IN THE AGE GROUP OF (15–49) AS PROPORTION TO TOTAL FEMALE (15–49) DEATHS IN RURAL AREAS OF ANATAPUR DISTRICT. INDIA, BY AGE OF WOMAN

Age of woman	Total female deaths (15–49) (All causes)				
	No. of total deaths	*No. of recorded deaths in health facility records*	*Percentage*	*No. of additional deaths identified*	*Percentage*
15–19	103	37	36.0	66	64.1
20–24	197	70	35.5	127	64.5
25–29	166	76	45.8	90	54.2
30–34	133	65	49.9	68	51.1
35–39	99	43	43.4	56	56.6
40–44	76	39	51.3	37	48.7
45–49	93	57	61.3	36	38.7
TOTAL	867	387	44.6	480	55.4

χ^2 = (15–24 V/S 25–49) = 15.03 $P < .001$

TABLE — 5

RECORDED MATERNAL DEATHS AS PROPORTION TO TOTAL MATERNAL DEATHS IN RURAL AREAS OF ANATAPUR DISTRICT, INDIA BY TYPES OF VILLAGES

Types of villages	Maternal Deaths				
	No. of total maternal deaths	*No. of recorded deaths in health facility records*	*Percentage*	*No. of additional deaths identified*	*Percentage*
PHC Main village	21	9	42.9	12	57.1
Subcentre village	112	38	34.0	74	66.1
Other villages	200	68	34.0	132	66.0
TOTAL :	333	115	34.5	218	65.5

$\chi^2 = 0.92$ $P > .005$

TABLE — 6

RECORDED MATERNAL DEATHS AS PROPORTION TO TOTAL MATERNAL DEATHS IN RURAL AREAS OF ANATAPUR DISTRICT, INDIA BY AGE OF WOMAN :

Age of woman	Maternal Deaths				
	No. of deaths	*No of recorded deaths in health facility records*	*Percentage*	*No. of additional deaths identified*	*Percentage*
15–19	49	11	22.4	38	77.6
20–24	105	28	27.7	77	73.3
25–29	82	34	41.5	48	58.5
30–34	55	26	47.3	29	52.7
35–39	35	10	28.6	25	71.4
40–44	6	5	83.3	1	16.7
45–49	1	1	100.0	—	—
TOTAL :	333	115	34.5	218	65.5

χ^2 = (15–24 V/s 25–39) = 7.96 $P < .01$

TABLE — 7

MATERNAL MORTALITY RATIOS (MATERNAL DEATHS PER 1000 LIVE BIRTHS) IN RURAL AND URBAN AREAS OF ANATAPUR DISTRICT, INDIA 1984–85.

Location	*Estimated Population of the district*	*No. of Estimated live births*	*No. of Estimated maternal deaths*	*Maternal mortality ratio*
Urban	569500	10650	58	5.45
Rural	2307746	84924	705	8.30
Combined	2877246	95574	763	7.98

TABLE — 8

AGE SPECIFIC MATERNAL MORTALITY RATIOS (MATERNAL DEATHS PER 1000 LIVE BIRTHS) IN THE RURAL AND URBAN AREAS OF ANATAPUR DISTRICT, INDIA 1984–85

Age of the women	Age specific Mortality Ratio (deaths per 1000 live births)		
	Rural	*Urban*	*Combined*
15–19	7.96	1.31	5.39
20–24	8.26	5.32	7.93
25–29	7.02	2.22	6.02
30–34	11.62	6.96	10.90
35–39	13.27	8.57	12.85
40–44	3.61	17.86	4.36
45–49	2.71	—	2.21
TOTAL :	8.30	5.45	7.98

TABLE — 9

AGE SPECIFIC MATERNAL MORTALITY RATES (MATERNAL DEATHS PER 10,000 WOMEN, 15–49) IN RURAL AND URBAN AREAS OF ANATAPUR DISTRICT, INDIA 1984–85

Age of the woman	Maternal Mortality Rate		
	Rural	*Urban*	*Combined*
15–19	10.4	2.9	8.4
20–24	23.2	7.5	19.5
25–29	17.9	3.3	15.0
30–34	16.3	7.2	14.5
35–39	12.8	3.0	10.6
40–44	3.0	2.8	3.0
45–49	0.7	—	0.5
TOTAL :	14.2	4.1	12.0

TABLE — 10

MATERNAL DEATHS AS PROPORTION OF ALL DEATHS IN THE FEMALE AGE GROUP 15–49 IN THE RURAL AND URBAN AREAS OF ANATAPUR DISTRICT, INDIA BY AGE :

Age of women	Percentage of Maternal Deaths to total deaths from all causes in the reproductive age group 15–49		
	Rural	*Urban*	*Combined*
15–19	47.6	50.0	48.0
20–24	53.3	44.2	51.7
25–29	49.4	25.0	45.5
30–34	41.4	34.3	39.9
35–39	35.4	18.5	31.7
40–44	7.9	17.6	9.7
45–49	1.1	—	0.8
TOTAL :	38.4	28.2	36.4

TABLE — 11

LEVEL OF MATERNAL MORTALITY IN THE RURAL AREAS OF ANATAPUR DISTRICT, INDIA, BY DEVELOPMENT STATUS OF THE VILLAGE :

Development status of the village	*No. of villages*	*Percentage*	*Population*	*Percentage*	*Maternal deaths per 10,000 woman (15–49)*	*Maternal deaths per 1,000 live births*
Poorly developed	60	4.3	13,860	1.2	39.19	21.66
Somewhat developed	465	33.3	1,87,792	17.2	26.09	15.23
Adequately developed	604	43.3	4,61,355	42.3	13.74	8.03
Highly developed	266	19.1	4,27,633	39.2	8.83	5.16
TOTAL :	1395	100.0	10,90,640	99.9	14.25	8.30

TABLE — 12

LEVEL OF MATERNAL MORTALITY IN THE RURAL AREAS OF ANATAPUR DISTRICT, INDIA, BY DISTANCE OF VILLAGES FROM GOVERNMENT HEALTH FACILITIES :

Type of village according to health facility	*No. of villages*	*Percentage*	*Total estimated population*	*Percentage*	*Maternal mortality per 1,000 live births*	*Maternal mortality per 10,000 women age 15–49*
PHC headquarter villages	22	1.58	1,29,945	11.91	4.82	8.25
Subcentre headquarter villages	181	12.97	4,01,607	36.82	7.60	13.00
Villages < 5 kms from PHC	115	8.24	47,760	4.38	9.70	16.60
Villages > 5 kms from PHC	1,077	77.20	5,11,328	46.88	9.64	16.50
TOTAL :	1,395	99.99	10,90,640	99.99	8.30	14.25

TABLE — 13

DISTRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA, BY OUTCOME OF LATEST PREGNANCY :

Outcome of latest pregnancy	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Live birth	165	63.0	12	54.5	177	62.3
Still birth	38	14.5	2	9.1	40	14.1
Abortion	27	10.3	4	18.2	31	10.9
Not delivered	32	12.2	4	18.2	36	12.7
TOTAL :	262	100.0	22	100.0	284	100.0

TABLE — 14

DISTRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA BY TYPE OF DELIVERY :

Type of delivery	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Normal	148	56.5	11	50.0	159	56.0
Prolonged	55	21.0	3	13.6	58	20.4
Not delivered and abortions	59	22.5	8	36.4	67	23.6
TOTAL :	262	100.0	22	100.0	284	100.0

TABLE — 15

DISTRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA, BY PLACE OF OCCURENCE OF DEATH

Place of occurence of death	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Home	112	42.7	4	18.2	116	40.9
Primary Health Centre (PHC)	10	3.8	—	—	10	3.5
Government hospital	97	37.0	17	77.3	114	40.1
Private hospital	19	7.3	1	4.5	20	7.0
On the way to hospital	24	9.2	—	—	24	8.5
TOTAL :	262	100.0	22	100.0	284	100.0

TABLE — 16

DISTRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANATAPUR DISTRICT, INDIA, BY FAMILY'S AWARENESS OF SERIOUSNESS OF PATIENT'S CONDITION BEFORE DEATH AND ACTION INITIATED :

Family's awareness about patient's condition before death and action initiated	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Not aware	61	23.3	2	9.1	63	22.2
Yes, health worker/doctor called and came	16	6.1	1	4.5	17	6.0
Yes, patient taken to hospital	149	56.9	19	86.4	168	59.2
Yes, worker/doctor not called	12	4.6	—	—	12	4.2
Yes, Patient died on the way to hospital	24	9.2	—	—	24	8.4
TOTAL :	262	100.1	22	100.0	284	100.0

TABLE — 17

DISTRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANATAPUR DISTRICT, INDIA, BY GESTATION PERIOD (IN WEEKS) AT DELHI :

Gestation Period	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
12 weeks	2	0.8	—	—	2	0.7
16 weeks	9	3.4	1	4.5	10	3.5
20 weeks	8	3.1	1	4.5	9	3.2
24 weeks	8	3.1	2	9.1	10	3.5
28 weeks	14	5.3	—	—	14	4.9
32 weeks	13	5.0	—	—	13	4.6
36 weeks	208	79.4	18	81.8	226	79.6
TOTAL :	262	100.1	22	99.9	284	100.0
Mean (weeks)		33.6		33.3		33.6

TABLE — 18

DISTRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA, BY TIME LAPSE BETWEEN DELIVERY AND DEATH :

Time lapse indays	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Same day	114	43.5	14	63.6	128	45.1
1 — 5 days	38	14.5	3	13.6	41	14.4
6 — 10 days	53	20.2	4	18.2	57	20.1
11 — 15 days	20	7.6	1	4.6	21	7.4
16 — 20 days	11	4.2	—	—	11	3.9
More than 20 days	26	9.9	—	—	26	9.1
TOTAL :	262	99.9	22	100.0	284	100.0
Mean days	7.3		2.5		6.93	

TABLE — 19

DSITRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA BY STAGE OF OCCURENCE OF DEATH :

Stage of occurence	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Antepartum	47	17.9	7	31.8	54	19.0
Intrapartum	32	12.2	1	4.6	33	11.6
Postpartum	183	69.8	14	63.6	197	69.4
TOTAL :	262	99.9	22	100.0	284	100.0

TABLE — 20

OBSTETRIC CAUSES OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANATAPUR DISTRICT, INDIA :

Obstetric cause of death	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Direct obstetric	170	64.9	20	90.9	190	66.9
Indirect obstetric	92	35.1	2	9.1	94	33.1
TOTAL :	262	100.0	22	100.0	284	100.0

TABLE — 21

CLINICAL CAUSES OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA :

Clinical cause of death	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
1. **Haemorrhage**	**30**	**11.4**	**5**	**22.7**	**35**	**12.3**
Antepartum	3	1.1	–	—	3	1.1
Postpartum	15	5.7	3	13.6	18	6.3
Abortion	12	4.6	2	9.1	14	4.9
2. **Sepsis**	**80**	**30.5**	**8**	**36.4**	**88**	**36.0**
Puerporal	59	22.5	4	18.2	63	22.2
Abortion	15	5.7	2	9.1	17	6.0
Postpartum tetnus	6	2.3	2	9.1	8	2.8
3. Ruptured uterus	13	4.9	2	9.1	15	5.3
4. Eclampsia	21	8.0	5	22.7	26	9.2
5. Retention of placenta	22	8.4	–	—	22	7.7
6. Post-operative infection	4	1.5	–	—	4	1.4
7. Severe anaemia of pregnancy	24	9.2	2	9.1	26	9.2
8. Infective hepatitis	28	10.7	–	—	28	9.8
9. Gastro-pateretis and dehydration	13	5.0	–	—	13	4.6
10. Respiiatory and pulmonary diseases	6	2.3	–	—	6	2.1
11. Enteric fever	8	3.0	–	—	8	2.8
12. Encaphalitis	4	1.5	–	—	4	1.4
13. Hypertension	2	0.8	–	—	2	0.7
14. Miscellaneous and not known	7	2.7	–	—	7	2.5
	262	99.9	22	100.0	284	100.0

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TABLE — 22

DISTRIBITION OF MAIN CLINICAL CAUSES OF MATERNAL DEATHS IN ANATAPUR DISTRICT, INDIA. BY MATERNAL AGE

Main clinical cause	*Total Death*	Maternal Age					
		15–19	20–24	25–29	30–34	35–39	40–44
Haemorrhage	21	4	5	6	4	2	–
Sepsis	71	11	28	21	4	7	–
Eclampsia	26	5	13	3	1	4	–
Abortion	31	7	5	6	7	5	1
Anaemia	26	2	7	4	4	6	3
Infective hepatitis	28	4	11	7	4	2	–
Other direct causes	41	8	13	17	2	1	–
Other indirect causes	40	11	9	8	7	5	–
TOTAL :	284	52	91	72	33	32	4

TABLE — 23

DISTRIBITION OF MAIN CLINICAL CAUSES OF MATERNAL DEATHS IN ANANTAPUR DISTRICT, INDIA, BY NUMBER OF LIVE BIRTHS

Main clinical cause of death	*Total No. of deaths*	Number of live births				
		0	1	2	3	4+
Haemorrhage	21	4	6	3	2	6
Sepsis	71	4	27	10	13	17
Eclampsia	26	6	9	6	2	3
Abortion	31	8	4	3	5	11
Anaemia	26	2	7	4	3	10
Infective hepatitis	28	4	10	7	5	2
Other direct causes	41	2	19	5	3	12
Other indirect causes	40	2	4	10	5	19
TOTAL :	284	32	86	48	38	80

TABLE — 24

DISTRIBITION OF MATERNAL DEATHS AIND CONTROL CASES IN RURAL AREAS OF ANATAPUR DISTRICT INDIA,, BY RELIGION

Religion	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Hindus	236	90.1	235	89.7
Muslims	25	9.5	24	9.2
Others	1	0.4	3	1.1
TOTAL :	262	100.0	262	100.0

$\chi^2 = 0.02$ $P > .05$.

TABLE — 25

DISTRIBITION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANATAPUR DISTRICT, INDIA, BY CASTE

Castes	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Non-scheduled Castes/Tribes	199	76.0	223	85.1
Scheduled Castes/Tribes	63	24.0	39	14.9
TOTAL :	262	100.0	262	100.0

$\chi^2 = 7.01$ $P < .01$.

TABLE — 26

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANATAPUR DISTRICT, INDIA, BY FAMILY TYPE :

Family Type	Maternal Death		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Joint	102	38.9	115	43.9
Nuclear	160	61.1	147	56.1
TOTAL :	262	100.0	262	100.0

$\chi^2 = 1.33$ $P > .05$.

TABLE — 27

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN RURAL AREAS OF ANATAPUR DISTRICT, INDIA, BY FAMILY SIZE :

Family Size	Maternal Deaths		Control Cases	
	No.	*Percentage of total*	*No.*	*Percentage of total*
Less than 3	71	27.1	21	8.0
4 to 6	106	40.4	130	49.6
7 to 9	56	21.4	69	26.3
More than 10	29	11.1	42	16.0
TOTAL :	262	100.0	262	99.9
Mean	5.58	6.84		
S. D.	2.77	3.37		

$t = -4.6752$ $P < .001$.

TABLE — 28

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN RURAL AREAS OF ANATAPUR DISTRICT, INDIA BY SOCIO ECONOMIC STATUS OF FAMILY :

Socio-economic status	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Higher	14	5.3	42	16.0
Middle	67	25.6	123	47.0
Poor	181	69.1	97	37.0
TOTAL :	262	100.0	262	100.0

$\chi^2 = 55.8$ $P < .001$.

TABLE - 29

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY LITERACY STATUS OF WOMAN

Educational status of woman	Maternal Deaths		CONTROL CASES	
	No.	*Percentage*	*No.*	*Percentage*
Literate	24	9.2	45	17.2
Illiterate	238	90.8	217	82.8
TOTAL :	262	100.0	262	100.0

$\chi^2 = 7.36$ $P < .01$

TABLE — 30

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY OCCUPATIONAL STATUS OF WOMAN :

Occupational status of woman	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Worked outside home for wages	111	42.4	109	41.6
Did not work outside home for wages	151	57.6	153	58.4
TOTAL :	262	100.0	262	100.0

$\chi^2 = 0.03$ $P > .05$.

TABLE — 31

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY EDUCATIONAL STATUS OF WOMAN'S HUSBAND :

Educational status of woman's husband	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Illiterate	170	64.9	139	53.1
Primary	66	25.2	75	28.6
High school and above	26	9.9	48	18.3
TOTAL :	262	100.0	262	100.0

$\chi^2 = 10.22$ $P < .01$.

TABLE — 32

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY FAMILY'S CONTRACT WITH OUTSIDE WORLD

Outside contacts	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Poor	137	52.3	94	35.9
Fair	100	38 2	120	45 8
Good	25	9.5	48	18.3
TOTAL	262	100.0	262	100.0

$\chi^2 = 17.0$ $P < .001$.

TABLE — 33

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA. BY MATERNAL AGE :

Age of the woman (Years)	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
15–29	50	19.1	27	10.3
20–24	83	31.7	107	40.8
25–29	69	26.3	86	32.8
30–34	28	10.7	33	12.6
35–39	28	10.7	5	1.9
40–44	4	1.5	4	1.5
TOTAL :	262	100.0	262	99.9
Mean 25.05	24.71			
S. D. 14.3	12.4			

$t = 0.2486$ $P = > .05$;

χ^2 (15–19 V/S other groups) = 8.04 ; $P < .01$

(20–34 V/S other groups) = 23.10 ; $P < .001$

(35–44 V/S other groups) = 14.0 ; $P < .001$

TABLE — 34

DISTRIBUTION OF MATERNAL DEATHS AND CENTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY AGE OF HUSBAND OF THE WOMAN :

Women's husband age (years)	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
< 24	20	7.6	15	5.7
25 — 29	94	35.9	100	38.2
30 — 34	54	20.6	89	34.0
35 — 39	44	16.8	36	13.7
40 — 44	34	13.0	14	5.3
45 +	16	6.1	8	3.1
TOTAL :	262	100.0	262	100.0
Mean 32.50	31.20			
SD 6.89	5.51			

t = 2.3851 P < .05.

TABLE — 35

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN RURAL AREAS OF ANATAPUR DISTRICT, INDIA, BY WOMAN'S AGE AT MARRIAGE :

Age at marriage of woman	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
< 15 years	32	12.2	32	12.2
15 years	46	17.6	43	16.4
16 years	62	23.7	73	27.9
17 years	49	18.7	56	21.4
18 years	50	19.1	41	15.6
19 years and above	23	8.8	17	6.5
	262	100.0	262	100.0
Mean 16.4	16.6			
SD 1.73	1.78			

t = — 1.3042 P > .05.

TABLE — 36

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF DISTRICT, INDIA, BY AGE OF THE WOMAN AT FIRST PREGNANCY

Age at first pregnancy(years)	Maternal deaths		Control cases	
	No.	*Percentage*	*No.*	*Percentage*
14 — 15	12	4.6	9	3.4
16 — 17	71	27.1	68	26.0
18 — 19	90	34.4	122	46.6
20 — 21	62	23.7	44	16.8
22 +	27	10.3	19	7.3
TOTAL :	262	100.1	262	100.1
Mean	18.75		18.56	
SD	2.40		1.82	

$t = 1.0210$ $P > .05$.

TABLE — 37

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF PREGNANCIES OF WOMAN :

No. of pregnancies	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
1	90	34.3	64	24.4
2	44	16.8	64	24.4
3	40	15.3	56	21.4
4	27	10.3	26	9.9
5	24	9.2	23	8.8
6	11	4.2	17	6.5
7 +	26	9.9	12	4.6
TOTAL :	262	100.0	262	100.0
Mean	3.05		2.96	
SD	2.28		1.84	

$t = 0.4972$ $P > .05$.

χ^2 (1 V/S others) $= 6.22$; $P < .05$

≥ 7 V/S $\leq 7 = 5.55$; $P < .05$.

TABLE — 38

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF LIVE BIRTHS

No. of live births	Maternal deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
0	29	11.1	—	—
1	81	30.9	66	25.2
2	44	16.8	68	26.0
3	37	14.1	53	20.2
4	24	9.2	26	9.9
5	19	7.2	26	9.9
6	12	4.6	13	5.0
7 +	16	6.1	10	3.8
TOTAL :	262	100.0	262	100.0
Mean 2.54	2.85			
SD 2.10	1.72			

$t = -1.8485$ $P > .05$

χ^2 (Birth order 1 V/S > 1) = 5.57 $P < .05$.

TABLE — 39

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF STILL BIRTHS

No. of still births	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Nil	215	82.1	248	94.7
One or more	47	17.9	14	5.3
TOTAL :	262	100.0	262	100.0
Mean 0.23	0.06			
SD 0.56	0.27			

$t = 4.4261$ $P < .001$.

TABLE — 40

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF PRIOR ABORTIONS :

No. of abortions	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
None	225	85.9	256	97.7
One or more	37	14.1	6	2.3
TOTAL :	262	100.0	262	100.0

Mean 0.17 0.05
SD 0.47 0.38
t = 3.2137 P < .01.

TABLE — 41

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY LIVING CHILDREN

No. of living children	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
0	96	36.6	—	—
1	64	24.4	82	31.3
2	46	17.6	83	31.7
3	19	7.3	48	18.3
4	22	8.4	26	9.9
5	8	3.1	13	5.0
6	4	1.5	8	3.0
7 +	3	1.1	2	.8
TOTAL :	262	100.0	262	100.0

Mean 1.49 2.38
SD 1.64 1.39
t = — 6.7010 P < .001.

TABLE — 42

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF MALE LIVING CHILDREN

No. of male living children	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
0	143	54.6	65	24.8
1	68	25.9	118	45.0
2	36	13.7	56	21.4
3	6	2.3	15	5.7
≥4	9	3.4	8	3.1
TOTAL :	262	99.9	262	100.0

TABLE — 43

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA BY BIRTH INTERVAL

Birth Interval (months)	Maternal deaths		Control Cases	
	No.	Percentage	No.	Percentage
≤ 18 months	13	5.0	14	5.3
19 — 24 months	40	15.3	56	21.4
25 — 30 months	39	14.9	44	16.8
31 — 36 months	38	14.4	43	16.4
37 — 42 months	13	5.0	20	7.6
43 — 48 months	13	5.0	9	3.4
49 + months	16	6.1	12	4.6
Not applicable (single pregnancy)	90	34.4	64	24.4
TOTAL :	262	100.1	262	99.9
Mean 31.02	29.74			
SD 10.22	9.37			

$t = 1.2487$ $P > .05$.

TABLE — 44

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY BIRTH INTERVAL BETWEEN LAST TWO BIRTHS :

Birth interval last two births	Maternal Deaths		Control Cases)	
	No.	*Percentage*	*No.*	*Percentage*
≤ 12 months	6	2.3	3	1.1
13 — 18 months	15	5.7	15	5.7
19 — 24 months	41	15.6	56	21.4
25 — 30 months	14	5.3	18	6.9
31 — 36 months	36	13.7	54	20.6
37 — 42 months	12	4.6	16	6.1
43 — 48 months	13	5.0	8	3.1
49 + months	35	13.4	28	10.7
Not applicable (single pregnancy)	90	34.4	64	24.4
TOTAL :	262	100.0	262	100.0

Mean 32.73 31.35
SD 12.86 11.31
$t = 1.0884$ $P > .05$.

TABLE — 45

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY USUAL SOURCE OF TREATMENT OF ILLNESSES IN THE FAMILY :

Source of treatment of illnesses	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Primary Health Centres (PHC)	50	19.1	45	17.2
Sub-centre	7	2.7	6	2.3
Other government health facilities	97	37.0	86	32.8
Private Practitioners in the village	15	5.7	23	8.8
Private Practitioners outside the village	92	35.1	100	38.2
Others	1	0.4	2	0.8
TOTAL :	262	100.0	262	100.0

χ^2 — (Government V/s Non-government source) = 2.23 $P > .05$.

TABLE — 46

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY KNOWLEDGE OF LOCATION OF PRIMARY HEALTH CENTRE (PHC) :

Location of PHC	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Known	109	41.6	150	57.3
Not known	153	58.4	112	42.7
TOTAL :	262	100.0	262	100.0

$\chi^2 = 12.83$ $P < .001$.

TABLE — 47

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY VISIT TO PRIMARY HEALTH CENTRE (PHC)

Whether visited PHC ever	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	88	80.7	90	60.0
No	21	19.3	60	40.0
TOTAL :	109	100.0	150	100.0

$\chi^2 = 12.45$ $P < .001$.

TABLE — 48

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY SATISFACTION WITH PRIMARY HEALTH CENTRE SERVICES (PHC)

Whether satisfied with PHC Services	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	78	88.6	88	97.8
No	10	11.4	2	2.2
TOTAL :	88	100.0	90	100.00

$\chi^2 = 5.72$ $P < .05$.

TABLE — 49

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY KNOWLEDGE OF LOCATION OF SUB-CENTRE :

Location of Sub-centre	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Known	176	67.2	197	75.2
Not known	86	32.8	65	24.8
TOTAL :	262	100.0	262	100.0

$\chi^2 = 4.10$ $P < .05$.

TABLE — 50

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY VISIT TO SUBCENTRE

Whether subcentre ever visited	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	115	65.3	113	57.4
No	61	34.7	84	42.6
TOTAL :	176	100.0	197	100.0

$\chi^2 = 2.22$ $P < .05$.

TABLE — 51

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA BY SATISFACTION WITH THE SUBCENTRE SERVICES

Whether satisfied with subcentre service	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	107	93.0	106	93.8
No	8	7.0	7	6.2
TOTAL :	115	100.0	113	100.0

$\chi^2 = 0.07$ $P < .05$.

TABLE — 52

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY VISIT TO OTHER GOVERNMENT HEALTH FACILITIES

Whether visited by any other government health facilities	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
No	4	1.5	17	6.5
Yes	258	98.5	245	93.5
TOTAL :	262	100.0	262	100.0

$\chi^2 = 8.34$ $P < .01$.

TABLE — 53

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY KNOWLEDGE OF FEMALE HEALTH WORKERS DOMICILLARY VISITS :

Knowledge about female health workers visits	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	204	77.9	200	76.3
No	58	22.1	62	23.7
TOTAL :	262	100.0	262	100.0

$\chi^2 = 0.17$ $P > .05$.

TABLE — 54

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA BY KNOWLEDGE OF PHC MALE HEALTH WORKER'S DOMICILLARY VISITS

Knowledge about the Male Health worker's visit	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	210	80.2	205	78.2
No	52	19.8	57	21.8
TOTAL :	262	100.1	262	100.0

$\chi^2 = 0.29$ $P > .05$.

TABLE — 55

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA BY PLACE OF DELIVERY

Place of delivery	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Home	164	62.6	239	91.2
Primary Health Centre (PHC)	8	3.1	3	1.1
Private Hospital	12	4.6	5	1.9
Government hospital	43	16.4	13	5.0
Others	3	1.1	2	0.8
Not delivered (died before delivery)	32	12.2	—	—
TOTAL :	262	100.0	262	100.0

χ^2 (Home V/S Other confinement) = 31.69 $P < .001$.

TABLE — 56

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY ASSISTANCE DURING DELIVERY :

Persons assisted during delivery	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
None	44	16.8	—	—
Relative and Neighbour	35	13.4	50	19.1
Trained Dai	13	5.0	46	17.6
Untrained Dai	87	33.2	118	45.0
ANM / LHVs	7	2.7	20	7.6
Government Doctor	49	18.7	16	6.1
Private Doctor	12	4.6	5	1.9
Others	15	5.7	7	2.7
TOTAL :	262	100.0	262	100.0

χ^2 (trained V/s untrained assistance) = 0.25. $P > .05$.

TABLE — 57

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA BY NUMBER OF COMPLICATIONS / PROBLEMS DURING PERGNANCIES

Number of complicated pregnancies	Maternal Deaths		Control cases	
	No.	*Percentage*	*No.*	*Percentage*
0	90	34.4	218	83.2
1	142	54.2	40	15.3
2	17	6.5	3	1.1
3	4	1.5	—	—
4	2	0.8	—	—
5 +	7	2.7	1	0.4
TOTAL :	262	100.1	262	100.0
Mean	0.92		0.19	
SD	1.16		0.51	

$t = 9.3248$ $P < .001$.

TABLE — 58

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT IN INDIA, BY PRESENCE OF PREDISPOSING HEALTH CONDITIONS

Presence of predisposing health conditions	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	128	48.9	30	11.5
No	134	51.1	232	88.5
TOTAL :	262	100.0	262	100.0

$\chi^2 = 45.0$ $P < .001$.

TABLE — 59

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF PREDISPOSING HEALTH CONDITIONS

No. of predisposing health conditions	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
None	134	51.1	232	88.5
One	105	40.1	24	9.2
Two	20	7.6	5	1.9
Three	3	1.1	1	0.4
TOTAL :	262	99.9	262	100.0
Mean :	0.57		0.14	
SD :	0.68		0.42	

$t = 8.7084$ $P < .001$

TABLE — 60

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY PRESENCE OF DANGER SIGNALS DURING PREGNANCY

Presence of danger signal	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
None	110	42.0	242	92.4
Excessive bleeding	34	13.0	2	0.8
High fever	37	14.1	7	2.7
Eclamptic fits	20	7.6	3	1.1
Combination of the above	21	8.0	2	0.8
Others	40	15.3	6	2.3
TOTAL :	262	100.0	262	100.1

χ^2 (Presence or nonpresence of danger signal) = 150.8. $P < .001$

TABLE — 61

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY REGISTRATION FOR ANTE-NATAL CARE AT HEALTH FACILITY

Whether registered for ante-natal care	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
Yes	119	45.4	174	66.4
No	143	54.6	88	33.6
TOTAL :	262	100.0	262	100.0

$\chi^2 = 23.4$ $P < .001$

TABLE — 62

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY MONTH OF PREGNANCY AT WHICH REGISTERED FOR ANTE-NATAL CARE

Month of pregnancy at which registered	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
< 5 months	6	2.3	5	1.9
5th month	77	29.4	112	42.7
6th month	12	4.6	22	8.4
7th month +	24	9.2	35	13.4
Not registered	143	54.6	88	33.6
TOTAL :	262	100.1	262	100.0
Mean:	5.48		5.51	
SD :	0.93		0.88	

$t = -0.2771$ $P > .05$

TABLE — 63

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF VISITS FOR ANTE-NATAL CHECK UP

Number of ante-natal visits	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
None	221	84 4	192	73.3
1	6	2.3	15	5.7
2	27	10.3	32	12.2
3	6	2.3	13	5.0
4	2	0.8	8	3.1
5 +	—	—	2	0.8
TOTAL :	262	100.1	262	100.1
Mean:	0.33		0.63	
SD :	0.81		1.22	

$t = 3.3160$ $P < .01$

TABLE — 64

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY NUMBER OF HEALTH WORKER'S VISITS TO WOMAN'S HOME

No. of Health worker's visits to woman's home	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
None	104	39.7	66	25.2
1	32	12.2	21	8.0
2	58	22.1	67	25.6
3	35	13.4	50	19.1
4	22	8.4	32	12.2
5 +	11	4.2	26	9.9
TOTAL :	262	100.0	262	100.0
Mean:	1.57		2.27	
SD :	1.69		1.90	

$t = 4.4558$ $P < .01$

TABLE — 65

DISTRIBUTION OF MATERNAL DEATHS AND CONTROL CASES IN THE RURAL AREAS OF ANANTAPUR DISTRICT, INDIA, BY ADVICE OR HELP SOUGHT DURING PREGNANCY

Person from whom advice or help sought	Maternal Deaths		Control Cases	
	No.	*Percentage*	*No.*	*Percentage*
None	229	87.4	241	92.0
Government health workers	10	3.8	9	3.4
Relatives	16	6.1	6	2.3
Private Practitioners	4	1.5	2	0.8
Dai	2	0.8	3	1.1
Others	1	0.4	1	0.4
TOTAL :	262	100.0	262	100.0

χ^2 (help sought or not) $= 2.98$ $P > .05$

TABLE — 66

SOCIO–ECONOMIC, DEMOGRAPHIC AND HEALTH BEHAVIOUR RELATED DIFFERENCES IN MATERNAL DEATH AND CONTROL CASES IN THE URBAN AREAS OF ANANTAPUR DISTRICT, INDIA :

Variable	*Maternal deaths*	*Control cases*	*Statistical significances*
1. Percentage of Hindus	63.6	68.2	P > .05
2. Percentage of scheduled caste/tribes ..	13.6	4.5	P > .05
3. Percentage in joint family	45.5	36.4	P > .05
4. Average family size	6.95	7.18	P > .05
5. Percentage of literate women ..	27.3	18.2	P > .05
6. Percentage of women worked outside for wages	9.1	9.1	P > .05
7. Percentage of literate husbands ..	72.8	59.1	P > .05
8. Mean socio-economic status score ..	6.5	6.6	P > .05
9. Mean outside contact score ..	3.36	3.95	P > .05
10. Mean age of women	27.14	26.32	P > .05
11. Percentage of women (15–19) ..	13.6	6.5	P > .05
12. Percentage of women (20–34) ..	68.2	93.5	P > .05
13. Percentage of women (35–44) ..	18.2	0.0	P > .05
14. Mean age of husband	34.82	32.41	P > .05
15. Mean age at marriage	16.50	16.14	P > .05
16. Mean age at first pregnancy ..	19.14	19.05	P > .05
17. Mean number of pregnancies ..	3.55	3.32	P > .05
18. Percentage of women pregnancy under 1	27.3	4.5	P < .05
19. Percentage of women pregnancies under 7	4.5	0.0	P < .05
20. Mean number of live births ..	3.1	3.2	P > .05

Table 66 Cont.

Variable	*Maternal deaths*	*Control cases*	*Statistical significance*
21. Percentage of women birth under 1 ..	26.3	9.0	P > .05
22. Mean number of still births ..	0.23	0.09	P > .05
23. Mean number of prior abortions ..	0.14	0.0	P > .05
24. Mean number of living children ..	2.36	2.86	P > .05
25. Mean number of living sons ..	0.91	1.41	P < .05
26. Mean birth interval (months) ..	29.59	30.59	P > .05
27. Mean interval last two births (months) ..	32.73	33.82	P > .05
28. Percentage using govt. health facilities as usual source of treatment of illnesses ..	54.5	40.9	P > .05
29. Percentage delivered at home ..	27.3	86.4	P < .001
30. Percentage received trained assistance during delivery	50.0	63.6	P > .05
31. Mean number of complicated pregnancies	0.73	0.45	P > .05
32. Percentage having predisposing health conditions	50.0	18.2	P < .05
33. Mean number of pre-existing health conditions	0.64	0.18	P < .05
34. Percentage having danger signals during pregnancy	59.1	9.1	P < .001
35. Percentage registered for ante-natal care ..	40.9	50.0	P > .05
36. Mean gestation period in months at which registered for ante-natal care. ..	5.4	7.8	P > .05
37. Mean number of ante-natal visits ..	1.14	1.09	P > .05
38. Mean number of health worker's visits to woman's home	0.0	0.18	P > .05

04639

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TABLE — 67

DISTRIBUTION OF MATERNAL DEATHS IN THE RURAL AND URBAN AREAS OF ANANTAPUR DISTRICT, INDIA, BY PREVENTABILITY OF DEATH

Preventability of death	Rural		Urban		Combined	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Definitely preventable	106	40.4	10	45.5	116	40.8
Possibly preventable	94	35.9	11	50.0	105	37.0
Not preventable	62	23.7	1	4.5	63	22.2
TOTAL :	262	100.0	22	100.0	284	100.0

SURVEY OF MATERNAL MORTALITY IN ANANTAPUR DISTRICT, ANDHRA PRADESH

PART — I

(Both for maternal mortality and control cases)

Date of interview :

Investigator's name :

Name of the respondent and relationship to woman :

A. VILLAGE INFORMATNON :

1. Name :
2. Population :
3. Location : On the main road/interior
4. Sub-centre :
5. PHC :
6. Nearest town :
7. Distance from sub-centre :
8. Condition of road to sub-centre : Mud/metalled/mixed
9. Usual mode of transport to sub-centre :
10. Distance from PHC :
11. Condition of road to PHC :
12. Usual mode of transport to PHC :
13. Distance from the nearest town :
14. Condition of road to nearest town : Mud/metalled/mixed
15. Usual mode of transport to nearest town :
16. Distance from nearest railway station :

17. Distance from nearest bus station :

18. Frequency of buses :

19. Post office in village : Yes/No

20. Educational institutions in the village : Primary School/High School/College/Any other (specify)

21. Electricity in the village : Yes/No

22. Health service providers

Trained Dais :

Untrained Dais :

Traditional Practitioners :

Allopathic practitioners :

Any other (specify) :

B. HOUSEHOLD INFORMATION :

23. No. of members in the household :

24. Type of family : Nuclear/Joint

25. Type of house : Pucca/Mixed/Kaccha

26. No. of rooms in the house :

27. Separate kitchen : Yes/No

28. Separate bath room : Yes/No

29. Electricity in the house : Yes/No

30. Religion :

31. Caste :

32. Whether ST/SC : Yes/No

33. Amount of land owned : _____ acres

34. Relationship of head of household to woman :

35. Main occupation of head of household :

36. Place of work :

37. Educational level of head of household : Illiterate/Primary/High School/College Any other (Specify)

38. Radio/transistor in the house : Yes/No

39. Do any members of the household read newspapers/periodicals : Regularly/Occasionally/None

40. Do you know where the nearest sub-centre is ? : Identified correctly/incorrectly/Don't know

41. Have you or any other members of your household ever been to the sub-centre ? : Yes/No/Don't know

42. If no, to Q. 41, ask why not ? :

Verbatim :

English translation :

43. If yes, to Q. 41, ask were your needs satisfied by the visit ? : Yes/No/Don't know

44. If not satisfied i.e., No. to Q. 43, ask the respondent to give reasons

Verbatim :

English translation :

45. Have you or any other members of your household ever been to PHC ? : Yes/No/Don't know

46. If no. to Q. 45, ask why ? :

Verbatim :

English translation :

47. If yes to Q. 45, ask were your needs satisfied, by the visit ? : Yes/No/Don't know

48. If not satisfied i.e., No. to Q. 47, ask the respondent to give reasons :

Verbatim :

English translation :

49. Have you or any other members of your household ever been to a govt. dispensary or hospital ? : Yes/No/Don't know

50. If no. to Q. 49, ask why ? :

Verbatim :

English translation :

51. Do you know when the male health worker visited your household last ? : Yes/No

52. If yes, when and for what purposes ? :

Verbatim :

English translation :

53. Do you know when the female health worker visited your household last ? : Yes/No

54. If yes, when and for what purposes ? :

Verbatim :

English translation :

55. Where do the family members go for treatment if any one falls sick ? :

56. Where do the family members go for marketing and how often ? :

57. Are any family members work in a town or city ? : Yes/No

C. INFORMATION ABOUT WOMAN :

58. Age :

59. Educational level : Illiterate/Primary School/High School/ College/Any other (specify)

60. Occupation (Previous if deceased) :

61. Age at marriage :

62. Husband's age :

63. Husband's educational level : Illiterate/Primary School/High School/ College/Any other (specify)

64. Husband's occupation :

65. Place of work :

66. Pregnancy history : Record on next page.

66. Pregnancy History:

Pregnancy order	*Outcome of pregnancy live birth/still birth/ spontaneous abortion/ induced abortion*	*Date of birth/ loss*	*Month of women's pregnancy when birth or loss occured*	*Sex of child if born alive*	*Type of birth Single/ twin triplet*	*Child still living Yes/ No*	*If No, age at death*	*If Yes, correct age*	*Place of pregnancy termination home/PHC hospital etc.*	*Who attended at delivery Dai/ANM LHV/ Doctor*	*Any problem during pregnancy or delivery Yes/No*
1.											
2.											
3.											
4.											

67. Problems during pregnancy :

Pregnancy order *Type of problem and what was done ?*

Verbatim :

English translation :

Verbatim :

English translation :

Verbatim :

English translation :

Verbatim :

English translation :

68. Was the woman registered for ante-natal care during last pregnancy ? : Yes/No/Don't know

69. If yes, at what stage of pregnancy ? : _____ months

70. If no, reasons for not registering :

Verbatim :

English translation :

71. No. of visits made to sub-centre/ PHC for ante-natal care :

72. If not visited even once, reasons for not visiting :

Verbatim :

English translation :

73. Did any health worker visit home of the woman during ante-natal period ? : Yes/No/Don't know

74. If yes, how many times ? :

75. During the last pregnancy did the woman ask any one for advice or help about her last pregnancy before delivery ? : Yes/No/Don't know

76. If yes, from whom the advice was sought ? :

77. How many months pregnant the woman was when the advice or help was sought ? :

78. Why the advice or help was sought ? :

Verbatim :

English translation :

79. Who provided the care and no. of times the care was provided. :

80. Were there any complications during the pregnancy and what was done ? Give details. :

Verbatim :

English translation :

81. Did the woman suffer from any of the following diseases during the last pregnancy ? :

a) Anemia	:	Yes/No/Don't know
b) Heart disease	:	Yes/No/Don't know
c) Diabetes	:	Yes/No/Don't know
d) High blood pressure	:	Yes/No/Don't know
e) Urinary tract infection	:	Yes/No/Don't know
f) Asthma	:	Yes/No/Don't know
g) Jaundice	:	Yes/No/Don't know
h) Lung disease (TB etc.)	:	Yes/No/Don't know
i) Malaria	:	Yes/No/Don't know
j) Peptic ulcer	:	Yes/No/Don't know
k) Liver disorders	:	Yes/No/Don't know
l) Any other disease (specify)	:	Yes/No/Don't know

82. Which of the following symptoms or signs occur during the last pregnancy ?

a) Excessive vaginal bleeding	:	Yes/No/Don't know
b) High fever	:	Yes/No/Don't know
c) Eclamptic fits		Yes/No/Don't know
d) Any other (specify)	:	Yes/No/Don't know

83. Place of pregnancy termination : Home/PHC/Hospital/Other health institution (specify)/Other

84. Who assisted the pregnancy termination : Nobody/relative/neighbour/trained dai/ untrained dai/ANM/LHV/Govt. doctor/ Private practitioner/Others (specify).

PART — II

(for only maternal mortality cases)

1. Date of death :

2. Month of pregnancy :

3. At what stage the death occured : *a*) Before the start of labour pains
   b) After the start of labour pains but before the baby was delivered.
   c) After the delivery of baby

4. If the child was actually delivered, indicate time between onset of labour and delivery of child :

5. If death occured after the baby was delivered, indicate the number of days between delivery and date of death :

6. Place of death : Home / Transit / Government Hospital/ Priivate Hospital / PHC / Any others (specify)

7. If death occured at home, why the woman was not taken to the hospital before death for treatment. Give detailed reasons :

   Verbatim :

   English translation :

8. If death occured in the hospital, indicate the condition of the woman at the time of taking her to the hospital :

   Verbatim :

   English translation :

9. What mode of transport was used to take her to the hospital ? :

10. Who accompanied the woman to the hospital ? :

11. How many days the woman stayed in the hospital before her death ? :

12. Did anybody advise that the woman be taken to the hospital ? : Yes/No/Don't know

13. If yes, who ? :

14. If death occured at home, who attended at the delivery ? :
    a) Untrained Dai
    b) Trained Dai
    c) Relative
    d) Neighbour
    e) ANM
    f) LHV
    g) Pvt. Doctor
    h) Govt. Doctor
    i) Any other (specify)

15. Did the person attending at the delivery tell the family about the seriousness of the patient's condition ? : Yes/No/Don't know

16. If yes, what was told and what suggestions were made ? :

Verbatim :

English translation :

17. Was any worker from the sub-centre/ PHC called to attend to emergency ? : Yes/No/Don't know

18. If yes, who was called ? :

19. If no, indicate the reasons :

Verbatim :

English translation :

20. What were the symptoms of the patient before her death ? Probe about chills, fever, cramps, oedema offensive odour etc. :

Verbatim :

English translation :

21. What do you think were the main causes of death ? :
   a) Spontaneous abortion
   b) Induced abortion
   c) Haemmorrhage before delivery
   d) Haemmorrhage after delivery
   e) Retained placenta
   f) Ruptured uterus
   g) Sepsis
   h) Eclampsia
   i) Tetnus
   j) Any other (specify)

22. Do you think any pre-existing illness of the woman complicated the delivery and caused her death ? If yes, give details :

Verbatim :

English translation :